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ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXX. No. 3349. JANUARY 30, 1942 6d. WEEKLY

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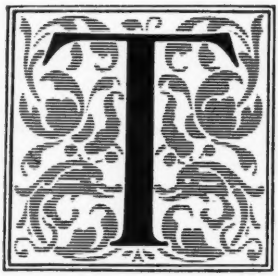

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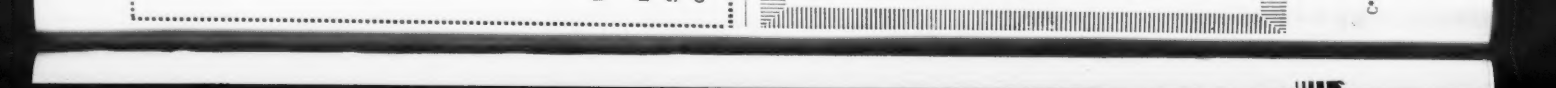

ELECTRICAL REVIEW

Volume CXXX No. 3349

Friday, January 30, 1942

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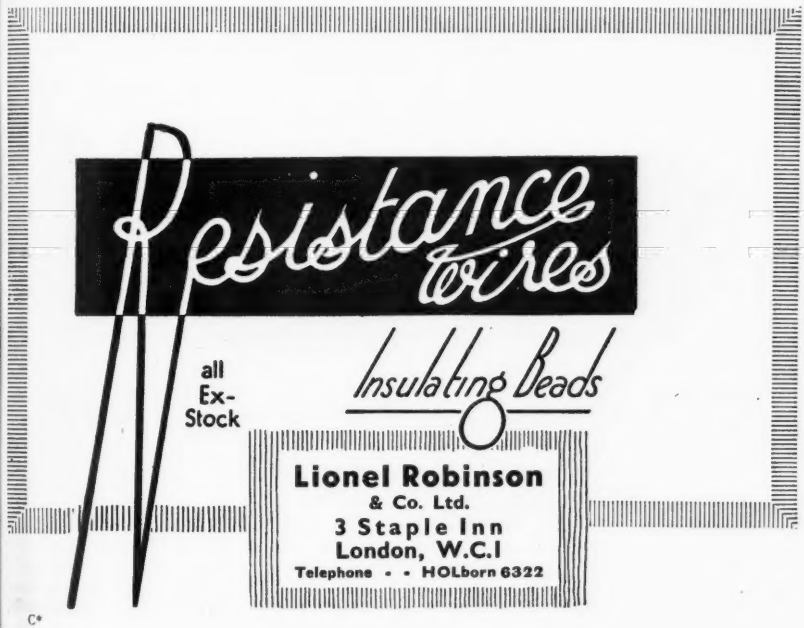

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXX. No. 3349. JANUARY 30, 1942 6d. WEEKLY

Advances in Manufacture

Adaptation of Standard Designs

QUANTITY production being the need of the moment, the tendency is for electrical manufacturers to concentrate their attention (except with regard to a very considerable amount of special armament work they are carrying out for the Government) on the repetition of well-established designs rather than on a search for improvements.

Information received from a number of leading companies indicates, however, that opportunities have been seized, wherever requisite to the fulfilment of the national purpose, to modify existing products in the direction of greater efficiency, simplification in construction and economy in material and labour, subject to the over-riding claims of reliability in service. Included in this is the better provision made in many cases for inspection and maintenance. Substitution of materials for those that have become scarce has not as a rule been found practicable, but much has been accomplished by making better use of the supplies available by means that may outlast the period of stringency.

Production Problems

Apart from a general intensification of demand for electrical apparatus, war conditions have made special calls for specific kinds of equipment (*e.g.*, flameproof gear in oil refineries) which has altered the proportion borne by the output of some departments to that of the whole works. In many instances new requirements arising out of the present situation have brought their own individual problems. Some of these are due to the drying up of foreign sources of essential commodities, such as paper and flax.

Examples of notable products of electrical engineering works are given in this issue. In order to gain a correct perspective, these should be regarded only as examples of achievements in the vast range of interests that is covered by our industry, many of the most inherently useful ways in which electricity is serving the nation being by now taken for granted. It seems barely possible, for instance, to overestimate the part played by electricity in materials handling or in fabrication as a factor in expediting output, towards which some useful advance has been made in adapting welding plant during the past twelve months.

Precision Control

Advantage has been taken of openings to apply electrical precision control to all manner of industrial processes from steel-mill plant to machine tools. In this connection the extending use of the Ward-Leonard system, together with recent rectifier developments, seems to have given a new lease of life to the DC motor when close control of speed is required, although the general-purpose squirrel-cage AC motor must be looked upon as providing the basis of industrial electrification.

Of the many less usual devices that have been employed to meet the exigencies of the times (such as motors for special

services and magnetic crack detectors for determining whether old plant should be retained in commission) there is every reason to expect that a good proportion will find their way eventually into standard practice. There is, however, something more important still. War circumstances have compelled the use of standard equipment in the great majority of cases. It is to be hoped that experience with equipment that conforms in all respects to the appropriate B.S.S. will impress users with the advantages to be gained by calling for standard apparatus in times to come instead of, as all too often in the past, requiring without strong reasons expensive variations from generally accepted types.

Fuel Saving

So far we have managed to get along without fuel rationing, but there still remains at least two months of cold weather and heavy demand for heating of various kinds. The appeal of electricity and gas undertakings to their consumers for economy in the use of cookers, fires, etc., has undoubtedly called forth a good response but we are not yet out of the wood. In consequence these undertakings are making a further call to their customers and particular reference is made to the use of electric fires in the morning when the factory demand is at its highest. It is unfortunate that the electric fire must be deprived of one of its principal advantages —quick heat for a short period exactly where it is needed—but needs must when a certain gentleman (or his friends) drives.

An Inter-Union Dispute

A SOMEWHAT queer case is reported by an Edinburgh area official of the Electrical Trades Union in the Union's January journal. One of his members, an electrical fitter, was transferred to an engineering establishment as a production inspector and was requested by the Amalgamated Engineering Union to produce apprenticeship "lines." Before he could do so the A.E.U. informed the management that unless he were dismissed they would withdraw their labour ; the management acquiesced whereupon the victim appealed against his dismissal without the sanction of a National Service officer. In the meantime the E.T.U. area Official secured his reinstatement, but upon his return the A.E.U. men stopped work and he was again dismissed. The National Service Officer, it is stated, feels that the implications of the case are such that he cannot deal with it and he has remitted it to headquarters. And so we cannot comment on it yet.

Users' Opinions

IT is no doubt an unattainable ideal that manufacturers of electrical equipment should have an intimate knowledge of the working conditions peculiar to each trade. To assist in bridging the gap we have published articles from time to time describing the varying applications of electricity as between industry and industry. Two papers on sugar factories, by Mr. L. B. Whitaker and Mr. B. Smith, presented before the I.E.E. last week, were designed to provide information of this kind, and the President, Sir Noel Ashbridge, intimated that they would be followed by others having the same purpose in view. The discussion provided opportunities for frank criticism by visitors of electrical methods which was none the less useful because it was not always flattering.

Electrical Education

One of the engineers responsible for the Jamaican sugar factory described, spoke of the necessity for the electrical education of sugar engineers. It was with this idea of showing non-electrical men what electricity can do that we started our descriptions of works electrification schemes many years ago. The interest aroused among works engineers in a very wide variety of industries has been made manifest by the numerous inquiries from them which our articles have prompted.

Valve Operation

CENTRALISED control of apparatus under responsible supervision has been carried to great lengths at the Burlington generating station, New Jersey. There, 81 valves ranging from 12 in. for a steam pressure of 1,250 lb. per sq. in. at 950 deg. F. to 3 in. in the oil system are operated by motors with rotors having low kinetic energy and controlled by push-buttons on panel boards. One significance of the arrangements adopted is that the Burlington station has been referred to in *Power* as the station whose design is considered to represent most closely the trend in the United States.

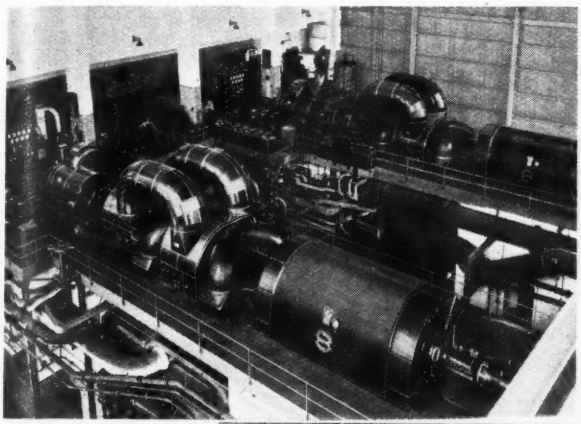
Progress in 1941

A Review of Manufacturing Activity

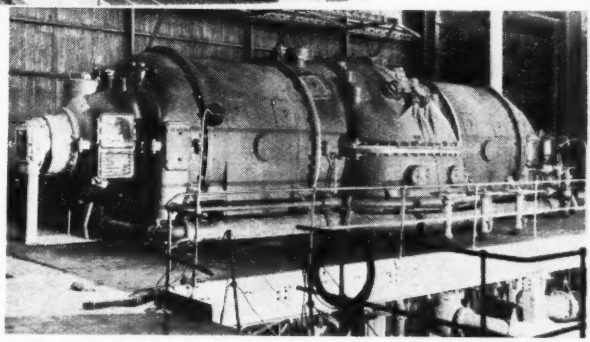
ALTHOUGH the attention of electrical manufacturers during the past year has been devoted primarily to meeting special war needs in directions that may not be discussed now, enough work of a more normal character is in hand or has recently been completed to give an indication of the progress that, despite all restricting influences, is undoubtedly being made.

The achievements here discussed, while serving the national purpose directly or indirectly, are only in accord with anticipated developments. Thus, for power stations the major proportion of turbo-alternators ordered have outputs of 20,000 kW and above at 3,000 RPM, the largest being a third Parsons 50,000-kW of that speed for Australia. Other sets from the same works include two of 30,000 kW for British stations (one generating at 33 kV) and two of 20,000 kW for South Africa with several of lower ratings for Canada and India and for industrial plants in Britain.

A number of smaller turbo-alternators for abroad have also been put in hand by the British Thomson-Houston Co., which has under construction for home and overseas stations several larger sets as well up to 30,000-kW including 33- and 22-kV alternators. Information received from the English Electric Co. is in similar vein, including the putting into commission of another 33-kV alternator; work is in hand on a 32,000-kW turbine for steam conditions of 1,300 lb. per sq. in. and 950 deg. F. In addition, the same concern has been occupied with hydro-electric activities, mostly for overseas; these include the setting to work of another 23,000-HP vertical-shaft turbine and the reconstruction of two 12,500-kW turbines of another make for New Zealand. It is hoped to have the first unit comprised in the 60,000-HP Liffey scheme in Eire running early this year. The Fraser & Chalmers Works of the G.E.C. report the completion of several 30,000- to 37,500-kW steam turbo-alternators. The Brush Co. has in production a number of quick-starting Ljungstrom machines in capacities up to 50,000 kW. The chief output of Metropolitan-Vickers turbines has been smaller self-contained plant, but some of the larger and more special sets previously

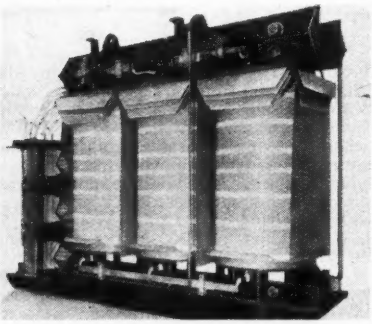


Two 50,000-kW Parsons three-cylinder turbo-alternators (3,000 RPM) with surface condensing plant in an Australian station



Brush-Ljungstrom 37,500-kW turbo-alternator in a British power station

ordered have been placed in service; for the higher steam conditions a new compact Venturi-type governor valve with improved steam-tight qualities is now being incorporated.



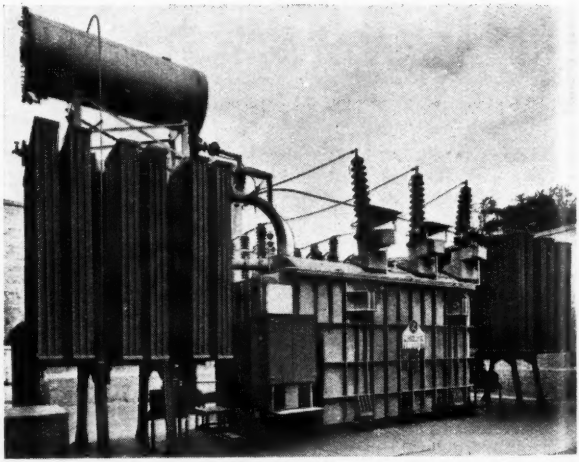
Ferranti 20,000-kVA 66-kV transformer of surge-stress control design

Oil engines have been in great demand, in many cases for giving emergency supplies of electricity to factories and Petters state that their resources for building 1½ to 375 BHP sizes are fully taxed. The English Electric Co. in addition to meeting home requirements is executing many orders for the Empire, the largest of which is for two 1,000-HP Diesels for the Electricity Supply Commission of South Africa; another is for a 400-HP rail-welding set for India.

Among transformers, those of the greatest outputs last year were two of 87,000 kVA at 11/66 kV built for a large power station by Ferranti's, who have a further 40,000-kVA unit in hand for another station as well as one 60,000- and two 45,000-kVA, 132-kV transformers for the Central Electricity Board. Deliveries abroad have included two 10,000-kVA three-winding 50/111/11-kV banks and two 20,000-kVA, 110/6-kV banks. This company's surge-stress control system designed to give from twice to five times normal strength against lightning has been extended to a wider range of voltage and rating. On-load tap-changing gear on the choke-coil method has been extended to larger ratings outside the scope of mercury switches, automatic operation being provided by the robust astatic voltage relay. Opportunities for the electrical control of industrial processes have advanced the sphere of utility of the moving-coil regulator.

Large 132-kV transformers for the grid have also been constructed by the Metropolitan-Vickers Co. These include two of 60,000 kVA of the mobile type and one of 45,000 kVA. The use of shunt reactors for power-factor compensation is illustrated by the installation of two 15,000-kVA 132-kV three-phase units, one of which could be tested at full-voltage and current owing to the power resources of the Switchgear Testing Co. A large number of transformers up to 19,000 kVA and 115 kV was ordered for abroad. A more novel kind of order was for 1,000- and 500-kVA transformers filled with non-inflammable "Traffo-dol" for installation in a power-station boiler-house; these are believed to be the largest of their kind to be built and installed in this country. A new development is a combined series-parallel and tapping regulating switch for use with resistance-type butt welders.

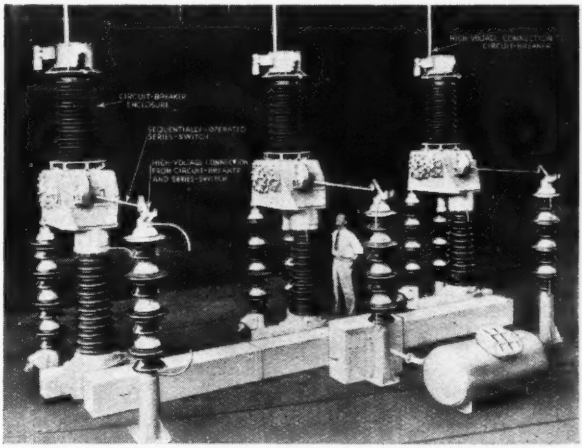
Contracts have also been placed by the C.E.B. with the English Electric Co. for 45,000- and 30,000-kVA transformers and 132-kV reactors, the latter at grid section points. These are in addition to orders from supply undertakings for transformers up to 30,000 kVA at 33- and 66-kV and for arc-furnaces up to 6,000 kVA. In addition, large transformers (including two 45,000-kVA banks) have been



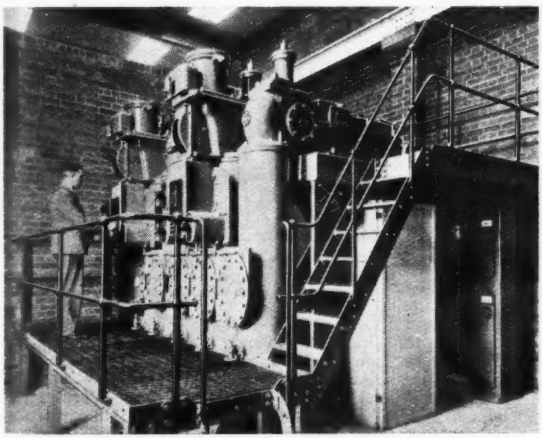
English Electric 30,000-kVA 132/33-kV ON/OFN transformer with on-load tap changing equipment

constructed for South Africa, New Zealand and India.

Of the same order of magnitude, in addition to the large number of distribution transformers being made by all these concerns, are the three-phase units from 60,000-kVA at 132-kV downwards by the B.T.H. Co., including several up to 10,000 kVA for overseas and up to 6,000 kVA for furnaces. The La Blanc system for three-to-two phase connection has been modified so that the transformers can be used later for three - to - three phase connection A 15,000-kVA oil - immersed three-phase shunt reactor has been completed for compensating for capacitance current in a 66-kV cable network. The Brush Co reports considerably increased activity in its transformer department, notably in regard to those required for electric furnaces. Major contracts awarded to or completed by C. A. Parsons & Co. include transformers of from 10,000 to 20,000-kVA, all except one being for 66 kV with on-load voltage regulation, and a number of furnace transformers and current-limiting reactors. Exports include seventy units ranging from 20 to 4,000 kVA and totalling 25,440 kVA for South Africa and forty-four of from 15 to 5,000 kVA, totalling 21,655 kVA for India. Mobile substations for meeting stand-by and seasonal demands have been described by the General Electric Co. Where conversion to DC is required, pumpless rectifiers up to 750-kW are accommodated in a single rubber-tyred trailer. Railway mounted units are also under construction up to 1,000-kW. Mention may also be made of two 5,000-kVA banks and transformers for New Zealand and a number of smaller units for India.



Reyrolle 600-A 132-kV pneumatically-operated circuit-breaker of low oil content with sequentially operated series switch

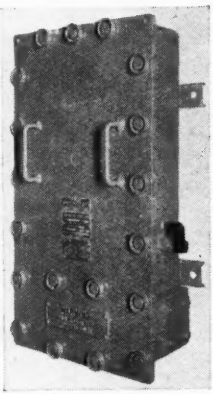


Section of "Metrovick" 33-kV, 750-MVA metalclad switchgear with duplicate busbars

Steel-tank rectifiers, both water-cooled and pumpless, and glass-bulb rectifiers up to 1,000 kW have been manufactured by the B.T.H. Co. during the past year. The English Electric Co. is producing the pumpless air-cooled type for 600 and 1,500 V and the pumped type with water cooling and forced draught for heavy-current requirements, including main-line traction at 3,300 V.

As regards switchgear, Reyrolle's report having supplied an outdoor pneumatically operated type for 132-kV with high-speed single-break circuit-breakers (which require only 10 gal. of oil per single-phase component) and sequentially operated series switches for

circuit isolation, which in the open position short-circuit the breaker, thus eliminating stress across it. Turbulators control the arc through the gases generated in this design and also in one design of the 1,500-MVA metal-clad equipment which has been built for 66 kV. Considerable orders (many from abroad) have also been received for 66- and 33-kV open switchgear, a feature of which is economy of material. The demand for compound-filled metalclad high-voltage switchgear, medium-voltage switchgear and air-break switchgear for mines shows a substantial increase over the previous year. A large number of Reyrolle busbar-zone protective systems have been,



B.T.H. flame-proof star-delta contactor starter for motors up to 15-HP

or are being, used with new and existing switchgear installations. Their experience of the effectiveness of busbar-zone protection is supported by information supplied by the Metropolitan-Vickers Electrical Co., whose main preoccupation recently in the control field has, however, been with industrial switchgear, the principle development being an enclosed type with current ratings up to 4,000 A and a rupturing capacity of 25 MVA at 400 V. The short-circuit duty of many old metal-clad units has been improved through the addition of cross-jet pots. In the high-voltage section a number of 132-kV oil-blast breakers fitted with high-speed trips have been under construction for the grid, but the major portion of the output has been exported to South Africa and New Zealand for voltages of from 66 to 110 kV. Low-oil-content, 33-kV circuit-breakers remotely operated by compressed air are also under construction.

The air-break principle is to the fore in B.T.H. productions and a good demand is reported for 440-V, 25-MVA switchgear and for a new design for 50 MVA at 2,200 V and 75 MVA at 3,300 V. A 440-V load-breaking isolator capable of making peak current equivalent to 25 MVA is another addition to the air-break range of the same concern. In some of the 6.6- and 11-kV compound-filled oil circuit-breakers, the cross-jet box method of arc control is being replaced by self-compensated explosion chambers, in which butt contacts serve for both main and arcing contacts.

The trend towards the employment of air-break switchgear for lower rupturing capacities is also evident in the works output of the English Electric Co., which again reports a steady demand for high-voltage switchgear, including 132-kV, 1,500-MVA low-oil-content breakers. The Brush Co. reports much activity in the manufacture of metal-clad vertical-isolation switchgear as well as in the medium-voltage industrial range. The G.E.C. has introduced a new type of 33-KV 750-MVA metalclad gear embodying low-oil-content breakers with phase separation.

Activity in heavy industrial applications is represented to a large extent by electrical equipment for steelworks, some of it being devoted to the modernisation of existing rolling mills such as that undertaken by the B.T.H. Co. This included the provision of a new screwdown drive and control equipment for a reversing mill driven by a 15,500-HP 48–96-RPM (peak rating) motor ; the two 120-HP screwdown motors are supplied from two 135-kW Ward-Leonard sets. A considerable number of drives were completed, including a 2,500-HP induction motor for a 28-in. three-high billet mill in India.

Orders in hand by the English Electric Co. include two large reversing mill equipments and a number of smaller non-ferrous mill drives. Met-Vick has found the greater activity in non-ferrous mills, one interesting example of which is a 300-HP induction motor driving a hot-brass mill at 25 RPM, the whole process being entirely automatic. Nearing completion of erection in this country are a 1,350–3,150 HP, 40–51-RPM DC reversing motor driving a 30-in. breaking-down mill

G.E.C. mobile substation showing two trucks housing a 920-kW rectifier and transformer with control apparatus

and a 3,000–10,000-HP DC reversing equipment for driving a 28-in. cogging mill for alloy steels. Both are supplied from fly-wheel motor generators. The company is now completing a second 2,500-HP geared Ward-Leonard winder and has one similar in an earlier stage of construction, but with a 2,650-HP motor.

An enlarged sphere for the Ward-Leonard system has been exploited by the Met-Vick Co.

in the application of unified boiler control to three more power stations during the year. Several AC winders are being built by the English Electric Co. and fitted with its system of DC dynamic braking.

Dynamic braking is also a feature of overseas winder installations lately completed by the B.T.H. Co. which, in another aspect of mining, has now in production a range of flame-proof motor starters which has been officially tested for employment in atmospheres containing firedamp, petroleum fumes, acetone vapour and coal gas.

The G.E.C. informs us that during the past year it has installed many electric furnaces for heat treatment, including those of the box type for carburising and annealing, the vertical-cylinder type for bright annealing and the forced air circulation type. Automatic continuous-conveyor designs have also been developed for aluminium alloy billets (low temperature) and for the heat treatment of small steel components. The greater life of tungsten and molybdenum high-speed tools hardened in the electric salt-bath has caused a considerable demand for furnaces of this type. Low-temperature baths have been supplied for preheating and quenching tools and furnaces have been developed for cyanide hardening and brazing assemblies. Two 700-ton Greenawalt sintering plants, each of two pans capacity, are under construction; these enable iron ore fines and residues to be utilised for the production of pig iron, thus increasing blast-furnace output.

Radiant heating for quick drying of paint and moisture films on metal has been engaging the attention of the G.E.C. and the Met-Vick Co. which have developed lamps and fittings for the purpose.

Encouraging accounts have been received of the value of the application of 80-W fluorescent 5-ft. tube lighting, especially in regard to the absence of glare and the small amount of heat emitted compared with other methods of illumination.

Electricity in Hong Kong

An Old Resident's Memories

By C. A. Middleton Smith,
M.Sc., M.I.Mech.E., LL.D.
(Formerly Taikoo Professor of Engineering, Hong Kong University)

ALTHOUGH there is yet very little detailed news of the last few days of the heroic defence of the island of Hong Kong, it seems to be only too true that sixteen members of the British staff of the Hong Kong Electric Co. are "missing," including the very energetic chief engineer and manager, Mr. Vincent D. Sorby, M.I.E.E. The electric power station, so vital to the welfare of the Colony, is (or was) situated on the north side of the island, directly opposite Kowloon on the mainland, about one and a half miles away. Had the attack by the Japanese taken place in 1913, the electricity supply would probably have lasted longer, for the former antiquated station was in a much less vulnerable situation.

It seems clear that the Japanese plan was to land their forces on the reclamation (flat land) alongside the power station and we can suppose that the missing members of the staff were on duty there when the final attack took place. It was my privilege to have known for many years Mr. Sorby, who had worked his way up to become manager after many years' service with the company; it does not surprise me to know that he was at the place of greatest danger during those last hours. During my long residence in Hong Kong he was known for his energy and even temper; he was in fact by temperament and training, the ideal manager of the supply company which he had helped to build up.

As the fifty-second ordinary meeting of the shareholders was held in Hong Kong in March, 1941, the company seems to date from 1889. When I retired from Hong Kong, in 1939, I brought with me copious notes about this company, and the corresponding concern which supplied electricity on the mainland—the China Light and Power Co., Ltd. Unfortunately my fairly extensive library, and my literary notes on engineering works in the Far East—accumulated over twenty-five years and during many thousands of miles of travel—were destroyed by enemy action in 1940, together with all of my personal possessions, so that I have to rely upon memory for details. In the Colony, Hong Kong Electric shares were regarded as a sort of trust security; endowment funds of the Hong Kong University were invested in those shares with the consent of the Finance Committee, including the Colonial Treasurer and the chief manager of the Hong Kong and Shanghai Bank. It was said that anyone who had invested a dollar in the company's shares in 1889 was obtaining a dollar a year revenue in 1939, which was not far off the truth.

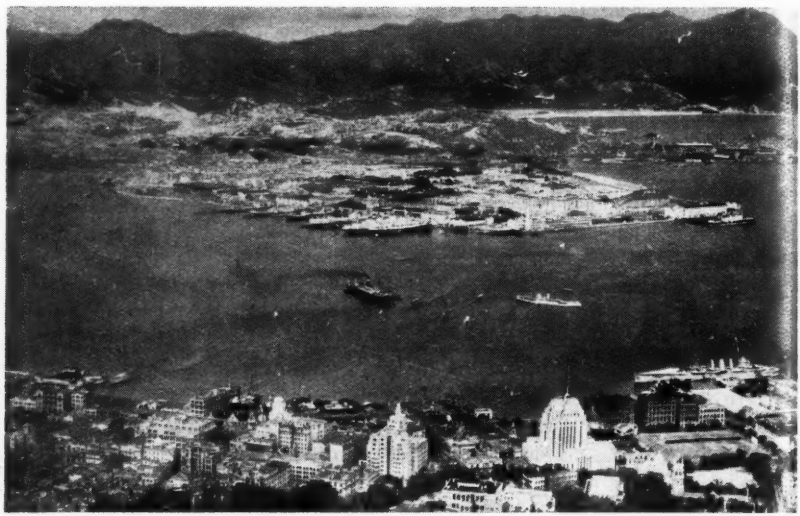
The earlier power station was situated on a rocky ledge about 500 ft. above sea level; all of the coal for the Belliss engines had to be lugged up the hillside from the seashore on the backs of coolies. Cooling towers were used for the circulating water and there was no more space on the rocky ledge for extensions. The

price charged per kWh seemed to me to be most excessive; also the supply system was single-phase, 75 cycles, so that every motor used had to be made especially for Hong Kong.

On my arrival in the Colony in 1912 I visited the power station and my caustic comments concerning the out-of-date local supply system resulted in a summons to Government House and in some subsequent stormy meetings between the Governor, directors of the company and myself. The result of the uproar was the splendid power station, built at sea level at North Point and designed by Messrs. Preece, Cardew and Snell, who later became consultants for the China Light and Power Co. on the mainland. When the Japanese invaded the Colony the electricity supply for the island, and on the mainland, was most efficient and the charges were very fair.

There seems to be no news about my friends on the staff of the China Light and Power Co., who no doubt remained at their post of duty to the last. When the history of this Far Eastern war is written there should be some record of the heroism of the engineers who kept machinery at work in the face of great dangers. Remember how the engineers of the Shanghai power plant moved up and down the river while the bombs were falling around them often very close to the power station; they did that sort of thing, not once, but for weeks during the invasion of Shanghai district. It was not only the British engineers who stuck to their work under heavy fire; the Chinese workmen stood by them. There is no one more loyal to a fair supervisor than the Chinese mechanic and it is my belief that the new China will owe more to the mechanic class than to any other section of the community.

During my last few years in the Far East I travelled extensively up the Yangtse (over 1,300 miles and through the gorges) to Chungking; also through Indo-China, Siam, Java and Malaya. Everywhere there was to be seen evidence of economic developments based on engineering works. It may not, even now, be realised what a tremendous prize is at stake in the South-West Pacific, for the surface of the treasures there have only been scratched.



In this view the city of Victoria, Hong Kong, is in the foreground. At the back is Kowloon and the Chinese mainland

Paper as War Material

LAST week we indicated some of the many uses of waste paper in the production of munitions. To show how essential it is that the salvage campaign should be as comprehensive as possible, including even small items which might be thrown on the fire as not worth bothering about, the following examples of particular applications may be cited:—One newspaper will make three 25-pounder shell cups; one popular magazine, the interior components of two mines; six old books, a mortar shell carrier; one soap-powder canister, four aero-engine gaskets; five medium-sized cartons, a shell fuse assembly; 60 large cigarette cartons, an outer shell container; 20 breakfast cereal cartons, a case for 3-pounder shells; six old bills, a washer for a shell; four assorted food cartons, a box for aero-cannon shells; and one old envelope, a cartridge wad.

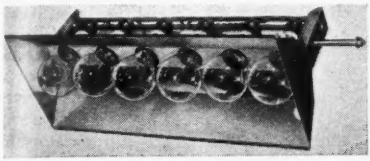
Infra-Red Radiation—I

Examples of Industrial Applications

By A. E. Tooke, B.Sc., A.Inst.P.
and
H. W. C. Gatehouse, Grad.I.E.E.

THE application of "near infra-red" radiation to low-temperature heating in industrial processes is an American development of recent years which has achieved considerable success in that country and is now attracting a great deal of interest among British manufacturers.

The industrial use of infra-red irradiation was pioneered in 1933 by the Ford Motor Co. in connection with the introduction of synthetic resin enamels for car finishes. That company holds patents covering the use of infra-red heat



Drying lamps in gold-plated trough reflector (G.E.C.)

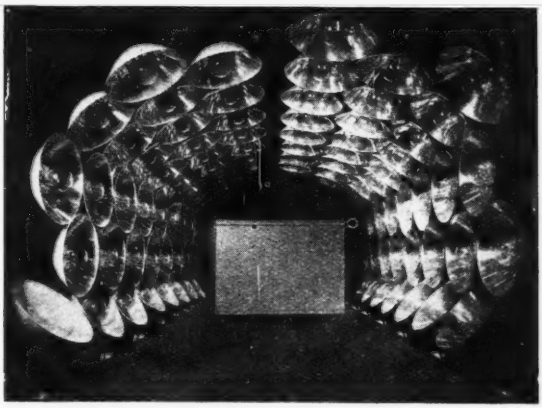
for baking enamelled surfaces; but as it has been the company's policy to allow the use of this method upon request without royalties of any kind, it has been adopted quite generally throughout the paint industry in the United States. Since that time, encouraged by the successful results obtained in this field, and the availability of well-designed equipment, many other industries in that country have taken up the process with enthusiasm, and there are now a very large number of installations in use covering a wide range of applications in drying and heating operations in many industries, and new uses are being discovered daily. Progress has also been made in Canada in the utilisation of the process, in which connection the Hydro-Electric Power Commission of Ontario has installed experimental equipment and is prepared to make tests for and recommendations to prospective users.

R. Maxted has recently described the principles and potentialities of the infra-red process, or "radiant heating" as it is sometimes called. The purpose of this article is to present a brief survey of the experiences to date in the applications of the process, as reported in the American technical press.

Equipment

The source of infra-red radiation employed is a special incandescent tungsten filament lamp, which is operated at a lower temperature (2,500 deg. K) than in the case of lamps used for regular lighting service (3,000 deg. K) and usually called a "drying," or "radiant heat lamp." Radiant energy from the lamp is directed on to the object by means of a metal reflector, which is usually gold-plated. Lamps and reflectors are in most cases mounted in banks or tunnels, called ovens, of various forms according to the type and size of the work to be carried out. In paint baking the work is usually passed through the oven in a conveyor.

Lamps are available in the United States in ratings of 250, 500 and 1,000 W. One type, a reflector drying lamp of 250 W, has a processed aluminium coating on the inside of the bulb and requires no auxiliary reflector. The



Radiant "tunnel," showing infra-red lamps and belt conveyor (G.E.C.)

maximum heat energy concentration so far obtainable from drying lamps is about 10 W per sq. in., which means that with present

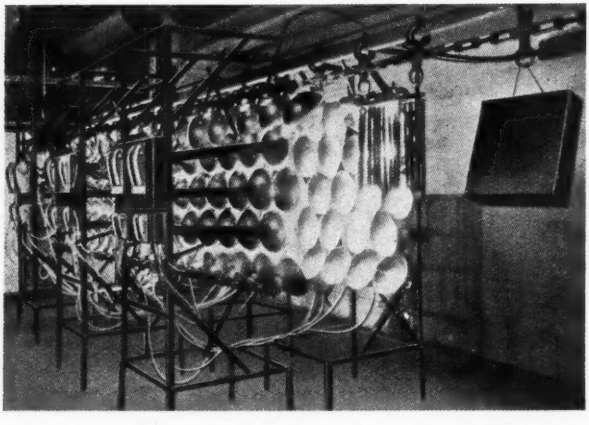
equipment the practical temperature limit is approximately 600 deg. F. British lamp manufacturers have recently entered the field, and 115 V 250 W drying lamps, together with suitable reflectors, are now available.

Paint Baking

By far the greatest number of infra-red installations so far are for paint baking, particularly on metal articles. Infra-red heat has not only provided a substitute for the gas-fired convection ovens which have hitherto been more or less standard equipment, but has also made it practical to bake out finishes for which air-dry lacquers were previously used.

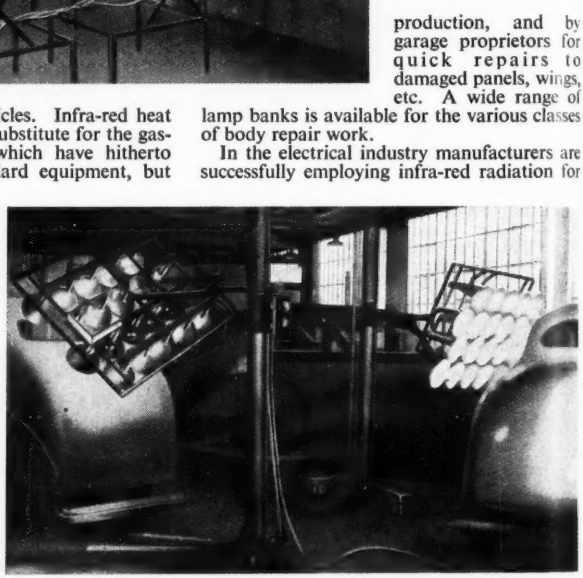
Paints of all classes can be processed more rapidly, although greatest success has been obtained with synthetic enamels; baking times as short as 5 minutes are now obtained by this process, as compared with 1 or 2 hours, say, by previous methods. Oil paints and oleo-resinous enamels require considerable oxidation to effect satisfactory drying and therefore cannot be baked so rapidly. Paint manufacturers in the United States have recently produced a number of finishes designed specifically for use with infra-red radiation. To-day a complete range of such finishes is available, including primers, surfacers and finishing coats, and it is possible to finish articles by infra-red methods with smooth finish, wrinkles, hammered effects and grains.

The first large-scale application of infra-red baking was in the manufacture of automobiles at the Ford Motor Co. plant at Dearborn (Mich.), the entire car body being baked in a lamp tunnel specially designed for the purpose. Portable lamp banks are now being widely used by automobile manufacturers to repair minor scratches and damage to cars during production, and by garage proprietors for quick repairs to damaged panels, wings, etc. A wide range of lamp banks is available for the various classes of body repair work.



Drying "tunnel" with chain conveyor, showing switches for separate lamp sections (Ontario H.E.P.C. *Bulletin*)

In the electrical industry manufacturers are successfully employing infra-red radiation for the baking of insulating varnishes. An installation in use by the Pyle National Co. of Chicago bakes out small coil windings and motor armatures in about one-half the time previously required by steam ovens. Coils and armatures are suspended on a channel-iron



Mobile pedestal lamp banks for motor car wings and panels — (*Electrical News and Engineering*, Toronto)

rack hung from a monorail, so that it can be run in on one side of the infra-red oven and out the other. The walls of the oven, on which the lamps are mounted, are movable and can be adjusted to bring the lamps to the optimum working distance, as it is desirable to keep the temperature below 275 deg. F. to avoid decomposition of the impregnating varnish, or charring of the tape. It is interesting to note that coils with white tape dipped in clear varnish attain to a surface temperature of some 50 deg. F. above that for black insulating tape and clear varnish.

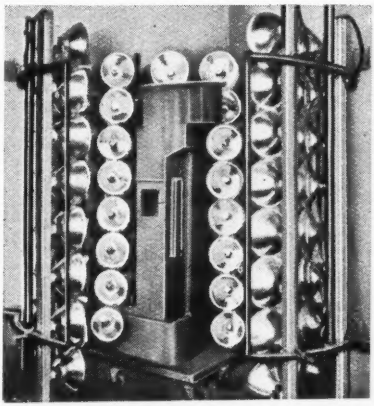
Good results are reported by other manufacturers in the baking of finishes on housings of electrical equipment, such as small and industrial size motors, control and electrical appliances. An equipment specially designed for small motor-baking work was recently introduced by the Fostoria Pressed Steel Corporation, of Ohio, one of the principal American manufacturers of infra-red equipment. It consists of a number of arms each carrying a lamp and reflector unit, each arm being adjustable and separately wired, making possible the use of any combination of reflectors.

The Westinghouse Electric & Manufacturing Co. has experimented with a drying lamp installation for the baking out of large (500 HP) traction motor armatures, but final conclusions have not yet been reported.

In the Chicago plant of the R. G. Hawkins Co. the infra-red process is employed in baking a wrinkled finish on large castings for drill presses and tapping machines. A special cylindrical lamp bank is used which is mounted on casters and split lengthwise, enclosing the casting during the baking operation. Lamps are arranged in eight rings of ten lamps, one above the other and spaced equally around the inside circumference of a simple angle-iron frame. Each of the eight rings of lamps is individually switched, so that the surfaces of the casting further from the lamps can be baked longer than others. With this equipment the company reports that the unit cost of finishing a casting is reduced to one-half and the rate of finishing increased by over 50 per cent.

One of the largest infra-red installations is that which was recently completed at the Thermandor Electrical Manufacturing Co.'s works at Los Angeles, for paint baking on electrical appliances. Departure from the ordinary open tunnel of lamps is made in this installation by enclosing the lamp and reflectors in a light-gauge steel shell, which adds a convection effect to the radiant heat drying. A 20 per cent. saving in energy by the use of this convection principle in addition to the radiant reflectors is estimated. Another innovation here is the use of a six-pointed star-shaped device, which is welded to each hook upon which the sprayed material is hung and engages with rods at intervals along the tunnel, causing the hook to twist round one sixth of a circle.

For baking the enamel coating on the inside of 55-gallon steel drums the Myers Barrel Co., of Oakland, employs an infra-red tunnel provided with a mechanism for rotating the drums. Not only was a high rate of drying achieved (drying time 6 min.), but the results obtained were more satisfactory than with the air-drying method previously used (drying time 16 hours). It would appear that with the infra-red method drying proceeds from the inside, leaving a hard non-porous surface which adds to the effectiveness of the liner of the drum.



Baking wrinkled finish on large lathe casting
(Electrical World)

In applying infra-red baking to finishes on wood, and similar materials of poor heat conductivity, uniform distribution of radiation becomes of particular importance, especially in large-scale operations. Applications to such materials so far reported are far fewer as it would appear that the choice of suitable finishes is more restricted. One interesting example which may be cited is the use of a photo-electrically controlled bank of drying lamps for drying the finishing coat on fibre wall-board in the Maizewood Insulation Co.'s plant at Dubuque, Iowa. This has practically doubled the drying speed as compared with steam methods formerly used and, what is more, the new single-deck oven is one-third the length of the four-deck oven which it displaced. The photo-electric control automatically energises the lamps when the board enters the tunnel and again switches them off when the board has passed the last bank of lamps.

The application of infra-red baking to the following classes of material has also been tested and found successful—baking of filler, sealer and finish on hardwood panels for wood radio cabinets; baking out synthetic enamel on "Masonite" panels; and baking enamels on moulded bakelite radio cabinets. A small-scale application which is actually being ex-

ploited is that of lacquer drying on wood pencil barrels.

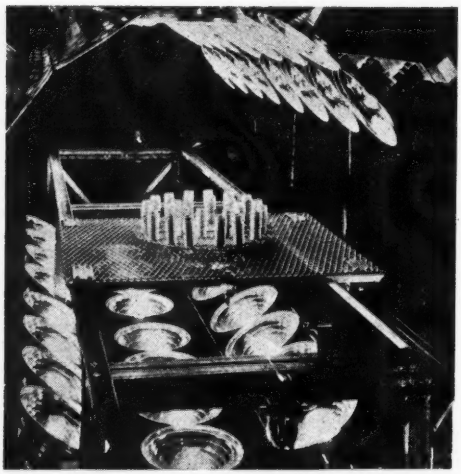
Drying Operations

A great variety of drying operations is being carried out in various industries, such as the drying of textiles, glues and dyes, photographic emulsion on glass, photographic prints, and the removal of surface moisture from metals.

One of the first textile applications was that by the Downs Carpet Co., Philadelphia, for Wilton rugs and carpets, resulting in 25 per cent. increased drying rate for heavy goods and 30–35 per cent. for lighter constructions.

An interesting example of the application of the process to glue drying is in the manufacture of radio loud speakers by the Permoflux Corporation, Chicago, in drying the glue that attaches the coil to the speaker cone, giving improvement in results as well as in production time.

The Westinghouse Co. recently reported the speeding-up of the glazing of porcelain insulators by infra-red lamps. Liquid glaze is flooded over the formed but unfired insulators, of the pin type, and then given a preliminary drying by a stream of warm air from hot-air pipes. Infra-red radiation is then employed, it being arranged that the inside skirts are dried quickly. Air and infra-red drying are then repeated in two further cycles respectively. The overall rate of drying was in this way increased by 20 per cent. Should production schedules demand a still greater rate, infra-red heat would be used in all stages of drying, in which case it is estimated that the drying rate would be almost five times as fast as free-air drying. Infra-red drying is stated to be not only faster, but also more thorough, as it tends to dry the moist clay from the inside outwards. During application of the glazing solution the formed piece absorbs moisture to a depth of about $\frac{3}{4}$ in. Air merely evaporates the surface moisture and leaves a softened moist shell of clay beneath the surface. Infra-red dried parts are said to be firmer and less likely to be damaged by subsequent handling.



Small electrical coils in drying "tunnel"— *(Electrical World)*

In porcelain enamel surfacing on metal the material is sometimes applied to the metal in water solution and infra-red irradiation has been used successfully for the removal of this water prior to the fusing process.

At the plant of the E.K. Wood Lumber Co., Los Angeles, timber is now being dried by infra-red rays instead of in the conventional kiln. Timber of size 1 in. by 12 in. is being dried in 40 min. instead of three days in the kiln. In addition to the great time saving, two outstanding points are that there is no tendency to warp or twist or for cracks to open up as in kiln drying. Further, after kiln drying, pitch will work out through paint, while with infra-red treatment the pitch becomes granulated and does not affect paint.

An interesting application reported recently is to the skin-drying of green-sand moulds for castings in the Krodel Brass Foundry, Waterbury. Frames incorporating a number of reflector type drying lamps of 250 W are supported above the moulds, in place of trays containing charcoal previously employed in this foundry. As compared with the latter method, the new infra-red process produces clean moulds and uniform heating, resulting in easily machined satisfactory castings and what is more, labour is reduced to the minimum.

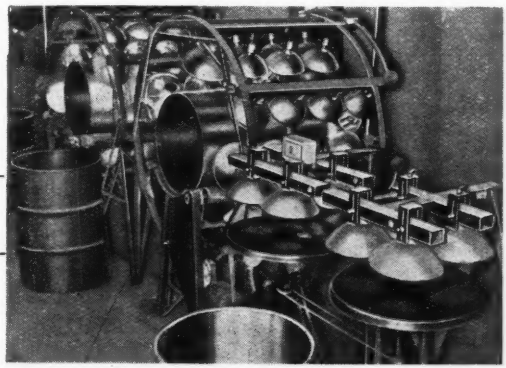
Drying lamps have been used successfully in drying out the stators of large electrical machines. A recent case of some interest was the drying out and baking of the stator of a 2,500-HP 300-RPM 2,300 V slip-ring motor installed aboard a dredger. The rotor was pushed back against the bulkhead, reflector lamps were mounted on the shaft and the latter rotated. The work was successfully completed aboard the dredger, without the stator having to be removed to the shop.

In the paper and printing industries, these lamps are being employed to dry out wrinkles, or curls, on the edges of paper stock caused by changes in humidity. Aluminium foil, however, curls up under these lamps, and they cannot be used for metallised paper with this coating. Experiments have been carried out which demonstrate that the process can be used for drying heavy paper board, but, so far, this method does not seem to have proved economical. The infra-red process is occasion-

ally used on printing presses for the drying of ink on paper, but it appears that few inks are available at the present time which are suitable for the application of this process. Aniline inks, using alcohol as solvent, are generally suitable; but " printers' ink," a slow-drying oil paint, is not suitable.

In the plastics and rubber industries, applications which are already being exploited are the drying of " Tenite " granules before moulding, and the drying of sprayed latex.

Various applications of infra-red radiation to pre-heating processes have been reported. Plastics and allied materials are being heated to produce softening preparatory to a mechanical treatment, *e.g.*, bakelite strips, sheets and tubes prior to punching; celluloid, preparatory to shearing; asphalt-impregnated fibre board, to facilitate bending or forming; glue, to improve workability.



Drying "tunnel" for steel drums (*Electrical West*)

Metals are preheated by the process, preparatory to the spraying of finishes, or to soldering operations. An interesting application is to the expansion of metals for close fits in various engineering parts. Thus, in the Westinghouse small motor plant at Lima, Ohio aluminium motor frames are heated, by passage through a drying lamp tunnel, to a temperature of 150 deg. C., which expands the 6¾ in. bore by 0.020 in., enough to allow the stator to be dropped into position, a method which has proved more satisfactory than the mechanical methods which were previously employed by the company.

The Timken Roller Bearing Co. uses infra-red lamps to heat bearing cones preparatory to assembly on shafts when a tight press fit is required. In the process employed by this company the bearing cones are not taken out of the boxes, but are allowed to remain stacked in their containers.

About 20 minutes is required to heat a bearing up to the maximum of 155 deg. F. The infra-red rays penetrate the boxes, heat the steel, but leave the cardboard relatively cold and, furthermore, with this method of heating it is not necessary to wash off the protective coating put on the bearings at the time of packing.

These lamps have also been used to prevent condensation of moisture on electrical equipment, particularly switchboards and control equipment, in situations of high humidity. In a particular case, a 1.500-W electric heater was used at the back of a switchboard in an attempt to raise the air temperature and prevent condensation.

It was found that this did not prove so effective as a single 200-W drying lamp in a reflector located near the bottom of the board and trained upon the metal surfaces of the base.

Power Schemes in Canada

CANADA'S supply of electrical energy, which drives more than 80 per cent. of industrial machinery, has become of vital importance now that a widened battle-front has placed new demands upon its war factories. At the outbreak of war the country was in the fortunate position of having a surplus of power and this has helped greatly in speeding up the production of munitions. However, the expansion of Canada's war industry is such that more electricity is needed.

Among the larger projects in hand for this purpose is a 54,000-HP plant at Barrett Chute on the Madawaska River, west of Ottawa. This plant, started only a year ago, is expected to be in operation by next June. Some 500 workmen have been toiling twenty-four hours a day in the wilderness above Clabogie Lake, blasting the rock, clearing the forest, and building a large concrete dam across the river channel. Behind this dam more than 200 acres of ground has been cleared of brush and timber to form the bed of an artificial lake.

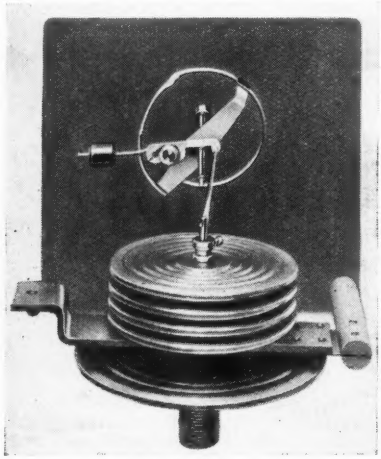
Another new power plant is nearing completion on the Musquash River. The Ogoki diversion, which will cause some of the streams of the James Bay watershed to change their course and flow into the Great Lakes, is another project going ahead at full speed. It will give more water power to the plants now in operation and allow others to be built. Since the outbreak of war a power line has been constructed across 280 miles of bush and farmland between Beauharnois, Quebec, and Burlington, Ontario, enabling the Niagara system to draw power from Quebec when needed.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Low-Pressure and Draught Gauge

ONE of the more recent applications of the transmitting system (Shotter patents) of ELLIOTT BROTHERS, LTD., Century Works, Lewisham, London, S.E.13, is to the remote indication and recording of low pressure, or



Gauge diaphragm assembly with transmitting loop and linkage

draught. The mechanically simple type of gauge employed for this purpose combines sensitivity with rapid action.

The multiple diaphragm element is of the type manufactured by Alexander Wright & Co., Ltd., of London, the single lower diaphragm forming a flexible connection between the inlet end of the upper gauging diaphragms and the external pressure. The moving parts are very light, violent fluctuation being damped by a needle valve that limits the rate of pressure change within diaphragms. Zero adjustment is effected by turning a milled head on top of the case, so rocking the spring-supported bar carrying the inlet end of the gauge diaphragms, the resulting displacement of which rotates the pointer needle of the instrument.

Two pilot wires only are required for transmission, over which telephony can be maintained simultaneously. The exciting field system is a laminated iron section fitted with a single magnetising coil, energised (55 W) with AC through a static voltage regulator. A small convertor can be used for DC. Contacts or relays are not employed.

The transmitting element is a metal loop which is rotated by the originating movement (pressure gauge or wattmeter, etc.) so that part of the loop traverses a narrow air gap, both being specially shaped to ensure that the current induced in the loop (proportional in magnitude to the amount of the gap flux which the entering loop embraces) is closely proportional to the angular displacement.

That portion of the coil which is remote from the exciting field is inductively coupled with an output field system consisting of a closed laminated iron section fitted with a single coil, in which is thus induced a current proportional to that in the loop as well as to its angular movement.

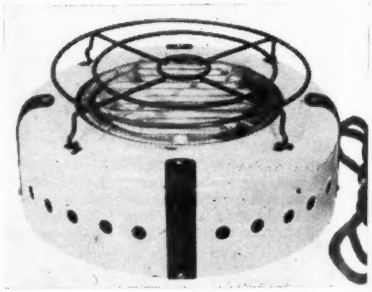
Circuit proportioning is such that input and output fields, in effect, constitute a current transformer that is unaffected (within limits) by variations in resistance of the output circuit, the latter being the equivalent of secondary burden. Therefore the accuracy of the transmitter is unimpaired by changes of pilot wire resistance due to variation of ambient temperature. The instrument may be illuminated internally by two 15-W lamps behind the opal scale. All terminals are within a box cast integral with the cast-iron case and fitted with cable glands, or conduit adaptors.

Inexpensive Boiling Ring

The latest addition to the range of "Mysto" appliances made by W. T. FRENCH & SON, LTD., Browning Street, Ladywood, Birmingham, 16, is an inexpensive boiling ring of rather unusual appearance.

It is of circular construction, approximately 9·5 in. in diameter, the body being made of heavy-gauge sheet steel and finished in an attractive shade of cream and black vitreous enamel. Its feet are insulated and a wire strut behind enables it to be tilted for alternative use as a fire, a facility that should be useful in the case of small air-raid shelters.

The heating element, loaded at 750 W, consists of a spiral mounted on a strong porcelain former, which is protected by a stout wire guard, so fitted



Enamelled-steel "Mysto" boiling ring with 750-W element

that it may be raised for toasting and lowered when boiling has to be done. A three-core flexible connecting cord is fitted, precautions having been taken to keep it cool where it enters the ring housing.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT was announced this week that **Mr. F. W. Ogilvie** has resigned from the position of director-general of the British Broadcasting Corporation. His duties are to be taken over jointly by **Sir Cecil Graves,** deputy director-general, and **Mr. R. W. Foot,** who was recently appointed general adviser on wartime organisation. Mr. Foot was formerly general manager of the Gas Light & Coke Co., and chairman of the Joint Gas and Electricity Committee.

Captain R. V. Beaver, R.E., who has been serving with the Middle East Forces for the past twelve months, was recently awarded the M.B.E. Capt. Beaver is the younger of the two sons of Mr. A. G. Beaver, managing director of the Sun Electrical Co., Ltd.

Mr. D. H. Roberts, electrical engineer to the Ruthin Borough Council, has been appointed electrical engineer to the Borough of Conway.

Mr. W. Murray Morrison, vice-chairman and managing director of the British Aluminium Co., has been awarded the Platinum Medal of the Institute of Metals for his outstanding services to the non-ferrous metal industries.

Mr. P. J. Haskell, who has been with the ELECTRICAL REVIEW for the past forty-eight years and was until recently advertisement manager, has been appointed a director of the company.

Mr. J. M. Evans, assistant manager of the development department of the Shawinigan Water & Power Co., has been appointed chairman of the Export Control Committee recently set up by the Canadian Minister of Trade and Commerce. Mr. Evans was born in England in 1905 and went to Canada at an early age, graduating from McGill University as B.Eng. (electrical engineering) in 1929.

Mr. Robert Hodgson has been appointed mains superintendent with Middlesbrough Corporation in succession to the late Mr. E. J. O'Connor.

Major R. H. B. Candow, R.A.O.C., Dundee, has been promoted lieutenant-colonel and Assistant Director of Ordnance Services (Engineering). Before the war Colonel Candow was assistant manager of the Dundee branch of the General Electric Co., Ltd.

Mr. W. M. Bissell has resigned from the position of area official (West of Scotland) to the Electrical Trades Union upon being appointed deputy commissioner of labour, British Guiana.

Mr. W. S. Philcox has been appointed vice-chairman of the Telephone Manufacturing Co., Ltd., and joint managing director of Telephone Rentals, Ltd. **Mr. W. A. Jackson** has been co-opted to the board of the latter company.

Mr. S. H. Penning, deputy borough electrical engineer at Woolwich, has retired after forty years' service with the undertaking, and at a recent meeting of the Council tribute was paid to the services he had rendered. Mr. Penning was appointed junior assistant electrical engineer in 1901 and assisted in the early mains laying and street lighting in the borough. He became distribution engineer in the following year and was responsible for the introduction of the three-phase, four-wire system of distribution in 1906. In 1911 he was appointed deputy borough electrical engineer and introduced the two-part tariff for domestic supplies. He intimated his desire to retire in April last, but owing to the sudden death of Mr. F. F. Elliott, the late borough electrical engineer, he remained with the Council until a successor (Mr. W. A. Gallon) was appointed, in the meantime taking charge of the electricity undertaking. Prior to the Council meeting, Mr. Penning was presented by the staff with a silver teapot and hot-water jug, together with a plaque bearing the Woolwich borough arms, and an umbrella for Mrs. Penning.

In our last issue we referred to the annual presentation of long-service awards to members

Mr. A. Wynn (left) making the presentation of a long-service award to Mr. T. Birkett

of the Midland Electric Manufacturing Co., Ltd., including **Mr. T. Birkett,** director and late general manager of the company. We now reproduce a photograph showing the presentation being made to Mr. Birkett by Mr. A. Wynn, joint managing director.

M. Dmitry Zhimerin has been appointed People's Commissar for Electric Power Stations in the Soviet Union under a decree of the Presidium of the Supreme Soviet published last Friday. —*Reuter* (Moscow).

Obituary

Mr. G. Tilstone.—We regret to record the death which occurred on January 15th, at the age of forty-seven, of Mr. George Tilstone, A.M.I.E.E., chief engineer of the Instrument Department of the English Electric Co., Ltd. Mr. Tilstone joined the company in 1918 and occupied the position of chief of the Switchgear Test Department. Protective gear and relays were one of his major interests and the commissioning of automatic substations and distribution networks took him to many parts of the British Isles and overseas. He travelled extensively in the United States during 1932-33 to study watthour meter manufacture and shortly afterwards, when the E.E.C. opened a department

for the production of such apparatus, he was made responsible for its development and manufacture. He was a member of the Meter and Instrument Section of the I.E.E. and served on the Instrument Bearing Sub-Committee of E.R.A.

Mr. G. B. Crowder, solicitor to the British Electrical and Allied Manufacturers' Association for the past eight years, died on January 19th. Mr. Crowder was a partner in the firm of Vizard, Oldham, Crowder and Cash of Lincoln's Inn Fields, W.C.2.

Mr. W. B. Cole.—The death is announced of Mr. William Beale Cole, M.I.E.E., of the Engineers' Department of Marconi's Wireless Telegraph Co., Ltd.

Mr. J. T. McKinlay, electrical engineering manager, collapsed and died while at work in the Caledon shipbuilding yard, Dundee, on January 18th. He was forty-seven years of age.

Mr. C. D. Rae, C.I.E., O.B.E., who died at Taunton on January 16th at the age of fifty-nine, was formerly Senior Deputy Director-General, Indian Posts and Telegraphs.

Mr. Albert Bean, manager of the Isle of Wight Electric Light & Power Co., Ltd., died at Fishbourne on January 17th at the age of 56.

Mr. D. Martin.—The death occurred at Glasgow on January 17th of Mr. David Martin, O.B.E., M.I.E.E., Scottish district manager of A. Reyrolle and Co. Ltd., for over thirty-five years. Mr. Martin, who was sixty-eight, was a native of Glasgow and was educated at Allan Glen's (High School of Science) and the Royal Technical College, where he later was assistant lecturer in electrical engineering under the late Prof. Jamieson. His engineering training was obtained with the St. Rollox Iron Works, D. & G. Graham, and Andrews & Preece, and in 1897 he was appointed assistant works manager with Wm. McGeoch & Co., Ltd. Subsequently he held positions as manager of the electrical department of Mechans, Ltd., and assistant works manager to Ferranti, Ltd., joining Reyrolle & Co. in 1906.

During the last war he went to France with the 5th Scottish Rifles in November, 1914, and in 1916 was transferred to the Ministry of Munitions, becoming Chief Investigation Officer, West Midlands Division. He was president of the Association of Mining Electrical Engineers in 1926–27.

M. Andrei Ivanovich.—A *Reuter* message reports the death in Moscow on January 16th of M. Andrei Ivanovich, People's Commissar for Power Stations.

Advice to Contractors

London Rules Revised. Domestic Appliance Supplies.

THE Director of the Electrical Contractors' Association (Mr. L. C. Penwill) has circulated to members of his Association details of an agreement relating to wages and working conditions approved by the National Joint Industrial Council for the retail furnishing and allied trades on which are represented the National Association of Radio Retailers, the Wireless Retailers' Association and the National Federated Electrical Association.

The agreement, which takes effect from February 2nd, prescribes minimum rates of wages and conditions of employment for branch managers and manageresses, shop assistants and other employees engaged in retail distribution. For this purpose they are classified in three groups:—London, Provincial A (towns of 10,000 or more population), and Provincial B (all other districts). Between 250,000 and 300,000 people are affected by the agreement. It does not apply to persons engaged to carry out electrical contracting operations.

London Working Rules

As a result of negotiations the working rules for the London area (within a radius of twelve miles from Charing Cross) have been amended. It is provided that no alteration shall be made in the rules without the giving of three months' notice to expire on May 1st or November 1st in any year, fourteen days being allowed for representations to be made.

As regards travelling expenses, where the work is more than 12 miles from the shop Clause 13 (Country Allowance) of the National Working Rules is to apply. It is agreed that Good Friday shall be regarded as a holiday with payment at the rate of time and a half. The rules were to take effect as from the first full pay day after their signature (December 22nd).

Retail Deliveries

Electrical contractors and dealers may wonder how they are affected by the plan for the curtailment of retail deliveries by van. Mr. Penwill states that the view of the Ministry of War Transport is that the sale of electrical appliances from a shop should be considered as retail distribution, as also such work as the collection and re-delivery of batteries. The repair of electrical or other installations, even though it involves the use of material and spare parts, should not be treated as retail distribution.

Shortage of Appliances

Complaints have been made by members of the N.E.C.T.A., Ltd., that while they are unable to secure electrical appliances which are in short supply, people who appear to have started in the business since September, 1939, are obtaining them.

In this connection the operation of the Location of Retail Business Order may be effective, but members are warned to look out for advertisements of applications for licences so that if necessary they may make a protest against the starting-up of a new business.

As regards other businesses started since the war began, the matter has been brought to the notice of the Fair Trading Council, which recommends that available supplies should be rationed on an equitable basis among the pre-war customers of the manufacturers and wholesalers.

Members are asked to bring instances of the sale of shoddy apparatus to the Association's notice.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Bulk Supplies

MR. J. A. CARR'S article under the above title in your issue of last week seems to me to be special pleading in defence of the privileged position of selected stations. The author appears to imply that undertakings without a selected station are *small* ones and they alone have benefited by the 1926 Act; perhaps he would give his definition of a small undertaking.

Possibly Mr. Carr would have considered the Watford undertaking a small one, but at any rate the Central Board found it necessary to obtain an amending order to designate the Watford station as a selected one as the only way of dealing with its low cost of production. Again, the Chester undertaking, doubtless a small one in the author's view, has been refused an extension to its station although it has been admitted that this would have been cheaper for the undertaking than taking a supply from the Central Board.

It is admitted, by implication, that selected station owners make no contribution to the Central Board's expenses which include the cost of the grid, so it is obvious that the remaining small undertakings, as the author terms them, must pay these expenses. As it is computed that only approximately fifteen per cent. of the Board's sales are to other than selected station owners, it is quite clear where the inequity lies in paying for the grid.

Mr. Carr makes the half-hearted concession that selected station owners have received a measure of increased security due to connection to other stations—the connection, of course, being the grid. The grid was not planned for war conditions; in fact, it was apprehended to be very vulnerable and a source of weakness, whereas the reverse has proved to be the case, and I think it must be admitted by all that the security resulting from the grid has been of no less benefit to selected station owners than to the remainder, and consequently all should share in the cost.

The author drags in the cost of frequency change, but this is shared by all, including even those small undertakings who have themselves previously paid all the cost of their own frequency change. Finally, he refers to the expenditure in replacing station and substation switchgear, but this is one of the undisclosed costs due to the 1926 Act and is common to all undertakings connected to the grid, and as a rule is a heavier burden on the small undertaking than on the selected station owner.

To one, like myself, who was in the thick of the fight that centred round the 1926 Act, it is amusing now to read the whines of selected station owners when, at the outset, they and many others were all tumbling over one another in the scramble to be designated as selected stations. I suggest that the wide protection given to selected station owners under Sections 5, 7 and 13 of the 1926 Act gives them a positive advantage and not a negative one as indicated by the author, with the further advantage of inter-connection *via* the grid at someone else's expense.

*London, W.C.*2. F. W. PURSE.

Impedance Losses of Transformers

IN your issue of January 2nd, Mr. J. C. M. Sanders asks if the statement in my article published by you on December 12th, to the effect that the normal iron loss of a transformer is unaffected by temperature, has been proved experimentally. My experience of tests on different types of transformers of outputs up to 2,000 VA and voltages up to 33 kV, show that iron losses at maximum temperature after a " heat run " on full load do not differ from those measured before the " load run " with the transformer at the ambient test-room temperature.

Mr. Sanders is correct in his statement regarding the reduction of eddy-current losses, but he is perhaps not aware of the practical aspect of this as regards iron loss. The eddy-current loss decrease depends on the temperature coefficient of resistance, which for the type of iron normally used in transformer cores is approximately 0.00077 between 20 and 100 deg. C. The reduction in eddy-current loss is thus approximately 0.077 per cent. per 1 deg. C. increase in temperature.

If an iron-loss measurement at a test-room temperature of 20 deg. C. is to be corrected to the reference temperature of B.S. 171/1936, *i.e.*, 75 deg. C., then the eddy-current loss portion of the total iron loss must be reduced by $55 \times 0.077 = 4.23$ per cept. Now the eddy-current loss for 50-cycle transformers is about 20 per cent. of the total iron loss and the adjustment necessary in correcting from 20 to 75 deg. C. is thus only 0.846 per cent. of the total iron loss. The correction for temperature of iron losses is thus very small and is rarely if ever applied, being within the possible combined error due to vision, meter, ratio and frequency errors.

If the variation of hysteresis loss takes place as stated by Mr. Sanders, I doubt very much whether it is of sufficient magnitude to affect commercial transformer iron losses and I think he can rest assured that, from a practical standpoint at any rate, the iron losses of transformers

over the range of working temperatures are unaffected by temperature variation.

M. NICHOLSON-STENG,
*West Wimbledon, S.W.*20. Grad.I.E.E.

Engineers' Salaries

I SHOULD like to suggest to "Estimating Engineer" and others who have written on this subject that, with the exception of "Development Engineer" they are all missing the real snag in the problem. As "Development Engineer" points out, the ultimate value of salaries is purchasing power, and therefore, before any *useful* steps can be taken to obtain salaries commensurate with the value of their services engineers, technicians and others should (*a*) recognise, and (*b*) control by real democratic processes the factors which in turn control purchasing power.

The most important of these factors are money and the uses to which it is put, and credit values, paper profits, etc., and their ramifications. The Edinburgh electrical engineer, Mr. J. C. Eccles, put his finger on the spot in his address to the Edinburgh Electrical Society (ELECTRICAL REVIEW, November 15th, 1940) when he said ". . . engineers must, in the future, assume greater control of the activities of the human race, in order to prevent their own products from being turned to base uses by others who appeared to be devoid of any sort of moral responsibility."

But before they can do this they must provide the political machinery to give them the power, and this machinery must first be conceived, then designed, then fashioned, then operated. Not only engineers, but scientists, industrialists, agriculturalists, leaders of commerce and all others who wish to improve the world after the war must apply their knowledge and experience to the problem *now*. This means that they must select and elect their own competent Parliamentary representatives, not have them selected for them by political parties and "vested interests," and secondly, they must honestly recognise the evil factors, whether they be legal or otherwise, in the economic and political world that at present prevent the stabilisation of just and reasonable values.

Cardiff. ALPHA.

THE recent correspondence in your columns regarding the general position of engineers and technologists, taken in conjunction with your leading article of December 19th on "Specialists: The Problem of Technological Unemployment" and the letter from "Estimating Engineer, Manchester" in your issue of January 16th, prompt me to attempt to answer the points raised in this discussion.

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Mr. Oliver Lyle (Messrs. Tate & Lyle, Ltd.) opening the discussion, said it seemed to him that the engineers responsible for the Jamaican factory had allowed electrical considerations pure and simple to swamp other important factors. Their whole aim seemed to have been to cheapen the prime first cost of the electric gear. The alternators appeared to be so sensitive to temperature that they had to be put up wind while the boilers had been put down wind to leeward. The cables had been reduced to the shortest lengths; the 14-roller mill called for five motors, but only three had been provided, while the unfortunate superintendent of that factory was condemned for life to a main steam pipe which appeared to be 120 ft. longer than it need be. There was only one place for a power house in a sugar factory and that was between the boilers and the evaporators.

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Neither of the papers mentioned the trend that was sweeping through the world's sugar industry at the moment, *viz.*, the use of ultra-high-performance centrifugal machines, which was influencing profoundly the power requirements. There had not been any development that enabled a squirrel-cage motor to be suitably coupled to a centrifugal machine. Mr. Smith's machines worked on 7-minute cycles and took two minutes to accelerate to 960 RPM, but modern high performance was very different from that. He (the speaker) had fifteen machines in one refinery which normally worked on a 2½-minute cycle and accelerated to 1,200 RPM in 40 seconds. Until the electrical industry could give the sugar industry an economical drive it would be impossible to make any progress. There was a faint glimmering of hope in the constant current drive designed by McFarlane.

Another feature of the sugar industry was the large amount of power wasted in refineries. Also there was no really good variable-speed type of motor available; motors had difficulty in dealing with local peaks and it was practically necessary to put in centrifugal pumps, which resulted in half the power put in being wasted. In one case he had a brand new boiler house, automatically controlled, and he was advised that the most satisfactory drive would be by induction motors through hydraulic couplings, but 21.7 per cent. of the energy put into one of the induced draught fans was lost in the hydraulic coupling. Four weeks ago he had sent out an urgent inquiry for a 175-HP motor to give a constant torque and a speed ratio of 5 to 1. He was told that the three-phase commutator motor was the thing and he was offered something which was 8 ft. long and 7 ft. high and costing £2,000 with a " mystery box " in which were the selectors, relays, knobs, buttons and valves.

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must be dealt with to suit individual requirements.

Mr. J. R. Smith asked whether the varying voltage used in factories had a detrimental effect upon the insulation of the motors. He knew of sugar factories where the voltage ranged from 200 to 500.

In the course of his reply Mr. B. Smith said that with one starter for six motors there would still have to be some separate protective devices. A great deal of damage was done by careless hosing, through water getting into the machines.

I.E.E. Western Centre Luncheon

THE Western Centre of the I.E.E. held a wartime luncheon at the Royal Hotel, Cardiff, on January 12th, when a total of 175 attended, including guests of the Institution, visitors and members. Among the guests were the president of the Institution, Sir Noel Ashbridge, the Lord Mayor of Cardiff and Lady Mayoress, officers representing the Royal Navy, Royal Engineers and Royal Air Force, while kindred institutions were also represented.

Mr. Edward Jones, M.I.E.E., M.I.Mech.E., city electrical engineer, Cardiff, and chairman of the Western Centre 1941 2, presided and the luncheon was followed by the 173rd ordinary general meeting, when a discussion on "Electrical Supply Problems arising from the War" was opened by Mr. W. A. H. Parker, A.M.I.E.E., and a considerable amount of interest in the subject was shown.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, February 19th, 6 p.m. London. Paper: "The Electric Spark," by Mr. J. M. Meek, M.Eng.

Wireless Section.—Wednesday, February 4th, 6 p.m. London. Paper: "Time Bases," by Mr. O. S. Puckle.

Meter and Instrument and Transmission Sections.—Friday, February 6th, 6 p.m. London. Paper: "Field Measurements of Insulation," by Messrs. E. A. Burton, J. S. Forrest, M.A., B.Sc., and T. R. Warren, M.A., B.Sc.

Transmission Section.—Wednesday, February 11th, 12.45 for 1 p.m. Holborn Restaurant, W.C.1. Informal luncheon (tickets 7s. each). On the same day (6 p.m.) the February Section meeting will be held, at which Mr. B. Wood, M.A., will deliver a paper on "City Distribution by Solid Low-Voltage Networks."

Installations Section.—Thursday, February 12th, 6 p.m. London. Inaugural address of Mr. H. T. Young as chairman (postponed from beginning of session), and paper on "The Application of Electricity to the Annealing of Glass Bottles and Containers," by Mr. E. S. Morris.

North-Eastern Centre.—Monday, February 9th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-upon-Tyne. Paper as for Meter and Instrument Section.

West Wales (Swansea) Sub-Centre.—Saturday, February 14th, 3 p.m. Exchange Buildings, Swansea. Paper: "Outdoor Bushings for Transformers and Oil Circuit-breakers," by Mr. W. A. Cook, B.Sc. (Eng.).

Mersey and North Wales (Liverpool) Centre.—Monday, February 16th, 5.30 p.m. Liverpool Royal Institution, Colquitt Street. Paper as for West Wales.

Dundee Sub-Centre.—Thursday, February 12th. Paper: "Applications of Electrical Industrial Heating," by Mr. A. F. Fekete, D.Sc.

North Midland Students' Section.—Saturday, January 31st, 2.30 p.m. Visit to Ferrybridge in conjunction with Sheffield Students' Section. Saturday, February 7th. Problems afternoon

Electrodepositors' Technical Society.—Tuesday, February 3rd, 2.30 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham, 3. Discussion of Ministry of Aircraft Production specifications and tests. Monday, February 9th, 4 p.m. Northampton Polytechnic, London, E.C.1. Paper: "Current Distribution on Interior Surfaces," by Dr. J. Kronsbein.

Royal Society of Arts.—Wednesday, February 4th, 1.45 p.m. John Adam Street, Adelphi, W.C.2. "Fluorescent Lighting," by Mr. H. C. Jenkins (G.E.C. Research Laboratories).

Association of Supervising Electrical Engineers.—Saturday, February 14th, 12.30 for 1 p.m. Connaught Rooms, London ,W.C.2. Luncheon and reunion (tickets 9s. 6d. each).

Institution of Chemical Engineers, jointly with the Chemical Engineering Group (Society of Chemical Industry).—Tuesday, February 10th, 2.30 p.m. Geological Society, Burlington House, London, W.1. Paper: "Design and Performance of Cooling Towers," by Messrs. W. K. Hutchinson, B.A., B.Sc., and E. Spivey, Ph.D.

Industrial Psychology

THE National Institute of Industrial Psychology, whose annual report has just been issued has completed twenty-one years' work. Founded at the end of the last war for the study of the psychological aspects of occupational problems, the Institute has since carried out investigations in industry, and has advised some ten thousand young and older people on their choice of occupation. It has undertaken research both on industrial and vocational problems and has furthered interest in the subject by lectures and publications.

There has been increased general recognition of the principles which the Institute has advocated. This is reflected in the fact that the services of almost all of its technical staff have been called for in connection with work for the fighting services. For the War Office and the Admiralty this work is in relation to the selection and allocation of recruits. For the Air Ministry the Institute has assisted with problems of gunnery and flying training.

A section of the report devoted to industrial work during the year shows that the Institute's investigators have been busy with such questions as the recruitment and selection of operatives, methods of reducing absenteeism, training, the use of non-financial incentives, the organisation of works councils and other matters closely affecting efficiency and morale.

Large-scale Heating

IN our report of the discussion of Mr. Gilchrist's paper on the above subject in our last issue we said that Mr. A. G. Kemsley commented on the author's selling price of 1d. per kWh. Mr. Kemsley writes to point out that this should have read "0.5d. per kWh"; we regret the slip.

COMMERCE and INDUSTRY

Teaching Welding Technique. Maintenance Men's Rates.

Training of Welders

EXTENSION of the use of the welding processes in munitions production requires the training of additional welding labour. To assist in meeting the need, the Ministry of Labour Training Centres have completely re-organised their welding training in accordance with recommendations put forward by the Institute of Welding. The training under the revised scheme gives a carefully graded course of instruction founded on basic principles, and arranged to provide the welder with a sound understanding of the operations and technique which he is required to master.

The Centres have a training capacity of 700 places of which 320 are for arc and 380 for gas welding. Operating on a three shift system, it is therefore possible to train 5,000 welders per annum for all requirements. The Centres are prepared to provide trainees or to give training in the following groups:—(a) Single purpose welders (downhand only) for mass production welding operations; (b) Specially trained welders for specific welding operations; (c) Men or women provided by the welding employer for training in specific welding operations; (d) Trainees who have received the complete syllabus of training and have passed the full series of proficiency tests for general work.

It is requested that employers likely to require welders from Government Training Centres shall notify the Regional Office of the Ministry of Labour of their probable requirements, on a form provided. The managers of the Centres will welcome discussions with individual employers on their requirements.

Export Control

Further classes of exports are brought under the licensing system by the Export of Goods (Control) Order No. 4, including machinery belt fasteners and telephone instrument and switchboard cords, fitted with plugs, tags or similar attachments.

Variations in other classes bring under control "domestic implements and hand operated machines of the kind commonly used for the preparation of food and drink, not elsewhere specified in the schedule of controlled goods." The control in respect of machine tool parts and accessories (including jigs and fixtures) is extended to cover small tools for machine tools.

Employment of Women

Under the Employment of Women (Control of Engagement) Order, which comes into force on February 16th, women between the ages of 20 and 30 will be placed in positions where they are most needed in the national interest when they leave their existing work or become available for employment. Consequently it is directed that such women may only seek employment or be engaged by employers through local Employment Exchanges. There are a number of exceptions, including nurses, school teachers and agricultural workers.

The Restriction on Engagement Order, 1941, covering building, civil engineering, electrical installation and general engineering remains in force but it does not apply to managers, salesmen, clerks or domestic servants. Certain agencies through which positions are found for technical and professional women may be approved by the Ministry of Labour upon application.

Census of Contractors' Plant

The Minister of Works has made an Order under which all persons or undertakings, including local authorities and public utility undertakings, owning certain items of contractors' plant must, when requested, furnish information about such plant. The following are the main items affected by the Order:—Excavators with their equipment; mechanical trenchers; mobile cranes mounted on road wheels; tractors with their equipment; portable compressors; dumpers mounted on road wheels; concrete mixers; and road rollers.

Requests for information covering these items are now being sent out by the Ministry to owners of contractors' plant. If any owner of plant described above has not received a copy of this request, he is asked to inform the Director of Plant, Ministry of Works and Buildings, Lambeth Bridge House, London, S.E.1, when the appropriate form will be sent to him. All forms must be returned to this address by February 8th.

Maintenance Electricians' Wages

By an agreement between engineering employers and the Electrical Trades Union the wages of maintenance electricians are to be not less than 8s. a week above the inclusive district time rate of skilled fitters. For maintenance electricians in receipt of "lieu" rates, compensatory or other bonuses, or merit bonus commonly applied, there will be no alteration in earnings but the increase will not be applied to them. Individual merit bonuses given for special reasons will be maintained in addition to the 8s. increase. The agreement came into force on January 12th.

Must Not Pay More

At a recent meeting of the District Joint Industrial Council for the Electricity Supply Industry Coventry Corporation asked the Council to agree to its paying more than the schedule rates to its electricity supply employees in view of the special conditions in the city. The employers' side of the Council considered that increases should only be given by way of national agreement and would not agree to the proposed action. The trade union side moved that the Council should reply that it "had no comment to offer on the application" but the employers voted against the motion. In reporting the matter, the *Electrical Trades Journal* says "negotiations will now proceed in Coventry and other towns for special increases."

Shellac Import Licences

The Board of Trade announces that the Open General Licence permitting the importation without separate licence of shellac from the British Empire, Palestine and Transjordan, the Free

French Colonies, the Belgian Congo and Ruanda-Urundi has been revoked. From January 26th, separate licences will be required, but this will not apply to goods which are proved to have been despatched to the United Kingdom before January 26th, and which are imported into the United Kingdom before March 26th. The term "shellac" includes seedlac and sticklac.

Applications to import shellac should be made on the standard form, copies of which may be obtained from the Import Licensing Department or from the offices of the Collectors of H.M. Customs and Excise and should be sent to the Import Licensing Department, Board of Trade, 1-6, Tavistock Square, London, W.C.1.

Control of Office Machinery

The Board of Trade has made a Supply of Office Machinery (Restriction) Order (S.R. & O. 1942 No. 29) to cover dictating, accounting, adding, calculating and punched-card machines, whether new, reconditioned or secondhand. As from January 21st no person may supply or acquire any such machinery, without permission. Persons wishing to acquire office machinery of the above kinds for their own use should submit their requirements to their suppliers. The suppliers will notify the Directorate of Office Machinery of these requirements, and the Directorate will then authorise the release of machines, in approved cases, so far as supplies will allow.

Persons wishing to acquire used machines either for immediate resale or for reconditioning and resale may apply to the Directorate of Office Machinery, Board of Trade, Millbank, London, S.W.1, for a general licence authorising them to acquire such machines. The Directorate will not normally be prepared to issue licences to persons who were not regularly engaged in buying and selling machines of this kind before September 1st, 1939, and who are not in possession of adequate facilities for re-conditioning and servicing. The approval of the Directorate will be required before any machines so acquired are disposed of or broken up.

The "Engineering Bulletin"

In recent months we have made occasional reference to the *Engineering Bulletin* published free of charge by the Ministry of Labour and National Service. The purpose of this publication is to assist managements of industrial concerns by providing useful information on the training of new entrants and on ways of making the best use of personnel, both men and women. It contains articles and up-to-date news of special interest to firms engaged in war production.

Any engineering firm which is not already receiving the *Bulletin* regularly and would like copies is asked to write, stating the number required, to the Director of Public Relations, Ministry of Labour, St. James's Square, London, S.W.1.

Wartime Imports

While an increasing proportion of all imports into the United Kingdom is now being brought in directly for Government account, more than 90,000 import licences, covering a great variety of goods, were issued by the Import Licensing Department of the Board of Trade in 1941. A considerably larger number of applications for licences was considered. After more than two years of import restrictions the general public is well aware of the results. As examples of the effects on market supplies it may be said that apart from a few cargoes diverted to this country in 1940 when various European countries were overrun by Germany, there have for two years been no importations from overseas of such goods as toys, domestic glassware, pottery, vacuum cleaners, domestic refrigerators, leather footwear, printing and textile machinery, toilet preparations, mechanical lighters, furniture, motor-cars and many other articles of common use, as well as many foods forming part of general diet in pre-war years.

Manufacture in Australia

The Australian Press reports that Lancashire Dynamo & Crypto, Ltd., have made arrangements with Oliver J. Nilsen & Co. Pty., Ltd., for the manufacture by that company at its Fitzroy (Vic.) works of Lancashire motors. For this purpose the Nilsen Company has extended its machine shops and general plant and erected a new motor bay and it is stated that Australian-made machines are already in service.

The manufacture of electric delivery vehicles has recently been commenced in South Australia by J. A. Lawton & Sons, Ltd. Attention is being concentrated on the production of a three-wheeled vehicle designed to carry a load of 8 cwt. The front wheel is used for both driving and steering, the electric motor being mounted on the spring column and driving the wheel through duplex roller chain. The 90 A Vesta battery is carried below the floor of the van; its capacity is stated to be from 30 to 40 miles on one charge at a cruising speed of 18 MPH and providing for eight stops to the mile.

Canadian Radio Production Halved

To conserve materials and labour for the nation's war effort, the Canadian Controller of Supplies has made an Order limiting the production of radio sets this month to one half the 1940 monthly average. The Order affects sets of all types other than those made for the Government. Last October radio production was reduced by 25 per cent. in a general Order which also covered refrigerators, stoves, vacuum cleaners and washing machines.

U.S. Electrical Equipment Sales

The greatly expanded war effort will increase sales of heavy electrical equipment and industrial materials to an even greater extent this year than in 1941, reports *Reuter's Trade Service* from New York. The industry has huge arrears of orders, and has already been forced to schedule 1943 production of turbines. Figures issued by the National Electrical Manufacturers' Association show that in transmission and distributing equipment as well as in industrial materials the industry reached a record figure in October. Orders for motors and generators for that month were below the September level, but still substantially above the corresponding month of 1940.

The index of orders received for transmission and distribution equipment rose 24.3 points to 384.7 in October, an increase of 6.7 per cent. A year ago, the index was below 250. Sales of industrial materials in October rose 18.3 points to 272.8, an increase of 7.2 per cent. Orders for motors and generators, which in June had reached a record of 450, fell again in October following a

September gain. The index dropped 37.2 points (10.1 per cent.) to 332.8. The adjusted index of major appliances declined to 167.8, a drop of 13.2 per cent., while the adjusted refrigerator index of sales billed rose 19.6 per cent. to 272.3.

Chromium Plating Restrictions

The Electrodepositors' Technical Society has been informed by the Ministry of Supply that after giving full consideration to the claims of various industries upon the supplies of chromic acid available it has been decided that chrome plating shall be discontinued for the following purposes :—Electric fire reflectors; sole plates for electric flat irons; electrical fittings and parts; motor-car, motor-cycle and bicycle fittings and accessories; office appliances; office machinery (including typewriters); weighing machines (spring balances, scales, etc.); fans; and electro-plated ware and fancy goods.

Collection of Scrap Rubber

The Ministry of Supply is fixing the prices at which scrap rubber may be sold and is at the same time giving directions as to the collection, sorting and storing of the material. Established waste-rubber merchants are to be licensed and scrap rubber may only be sold to them. Local authorities may, however, dispose of the material either to licensed dealers or to the reclaiming concerns. Household rubber articles may be disposed of through local garages.

Communication over H.V. Lines

The principles underlying the application of carrier currents to high-voltage transmission lines for communication purposes are explained in an article by Mr. J. S. Forrest, M.A., B.Sc., which appears in the February issue of the *Wireless World*. From some points of view, the author states, a high-voltage power line is almost an ideal communication line. The desiderata for communication circuits are low resistance, low capacitance and high insulation resistance, and a high-voltage power line fulfils all these requirements.

How to Save Electricity

Useful information regarding the economical use of the electric cooker, refrigerator, vacuum cleaner, laundry equipment, and space and water heating apparatus is given in a booklet entitled "Electric Economy," obtainable from the Electrical Association for Women, 20, Regent Street, London, S.W.1. (price 2d., or 3d. post free). Notes are also included on the care of apparatus and the reading of meters.

New Catalogues and Lists

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Publications dealing with air-break fuses, switches and plugs (No. 777/12/41); unit type metalclad lighting and small-power distribution switch and fuse gear (No. 1107/7/41); spare parts of flame-proof plugs and sockets for use in mines (No. 4255/8/41); single-phase metalclad draw-out pillar-type switchgear, class ESP (No. 455/9/41); attracted-armature AC relays, types QT, Q and W (No. 1109/10/41); type "L" slipring induction motors (No. 975/5/41); and applications and special features of Holmes variable-speed AC commutator motors (No. 1111/8/41).

Walker, Crosweller & Co., Ltd., Whaddon Works, Cheltenham.—A catalogue of "Arkon" specialities which include gas- and air-flow, pressure and vacuum indicators and recorders, gauges for water filling, inclined gauges for vacuum or pressure, rotary-piston meters, thermometers, seat-in-sleeve valves, strainers and valve position indicators.

Watson & Sons (Electro-Medical), Ltd., 76, Castle Street, Reading.—Miniature illustrated 16-page catalogue (No. 904–1041) describing a range of X-ray equipment for normal diagnostic requirements, medical and dental.

Change of Address

The London office of the Renold & Coventry Chain Co., Ltd., has been removed to 2, Caxton Street, Westminster, London, S.W.1 (telephone: Abbey 3878). The stock depot for counter sales will remain at Courtyard of N.E. Wing, Bush House, Aldwych, London, W.C.2.

Electrical Review Index

The index to Vol. CXXIX of the ELECTRICAL REVIEW (August-December, 1941) is now available to readers wishing to have it for reference or binding. Applications for copies should be made to the Publisher, ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1.

TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections may be entered within a month of January 21st.

PHILPLAST. No. 616,270, Class 9. Bells, bell-pushes, buzzers, coil holders, condensers, fuse holders and boxes, loudspeakers, junction boxes, plug and socket couplings, resistances, switches, switch boxes and covers, transformers, valve holders, and well plates for switches, all being electrical apparatus or instruments; and wireless apparatus and parts thereof.—J. A. Phillips & Co., Ltd., Credenda Works, Bridge Street, Smethwick, Birmingham.

ARBAL. No. 616,619, Class 9. Electrical conduit fittings.—Hartley & Baldwin, Ltd., Art Bolt Works, Willenhall Street, Darlaston, Staffs.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

ALLEN'S commutator lubricants.

GRAY-CASSON kVAh meter with m.d. indicator.

ELECTRICITY SUPPLY

Meter Reading at Cardiff. *Continental Restrictions.*

Andover.—FARMERS ASK FOR ELECTRICITY.—At a meeting of the local branch of the National Farmers' Union last week it was decided, on the proposal of Mr. E. C. Lovell, to press for electricity to be supplied to farms and farm cottages.

Cardiff.—SLOT-METER COLLECTIONS.—Reporting to the Electricity Committee on the difficulty of obtaining staff to collect money from slot meters, the city treasurer suggested that prepayment consumers should be asked to transfer to quarterly accounts. The city electrical engineer, however, offered to release male meter readers and to utilise the services of women for quarterly readings in order to assist the treasurer, and the Committee agreed to this being done.

Darlington.—LOAN.—The Electricity Commissioners have sanctioned the Town Council's plan to borrow money for work in connection with the electricity undertaking.

Eccles.—SHELTER INSTALLATIONS.—The Education Committee has approved a scheme submitted by the electrical engineer for electric lighting and heating in school shelters at a cost of £1,852.

LOANS SANCTIONED.—Sanction has been received by the Electricity Committee to loans of £1,500 for mains and services and £2,000 for substations and equipment.

Fleetwood.—DISPOSAL OF PLANT.—The Electricity Committee has accepted tenders for the disposal of surplus plant at the electricity works, the total amounting to £7,860. Subject to the approval of the Electricity Commissioners, the amount realised will be used to clear off the debt on the undertaking; there will be a balance in hand.

Lichfield.—MAINS AND SERVICES.—Sanction is being sought by the Electricity Committee to the borrowing of £2,000 for mains and services.

London.—ST. PANCRAS.—Electric heaters are to be installed in a number of basement shelters at a cost of £305.

HAMMERSMITH.—At present the fixed annual charge of the Council's No. 9 tariff for business premises is based on the maximum installed wattage of lamps in any period of twelve months. As adjustments are made by consumers at various times, and the fixed charge is varied accordingly, causing unnecessary work, it has been decided to amend the tariff so that the charge is based upon the maximum installed wattage of lamps in November and December only of each calendar year.

WATER PUMPING PLANT.—The Metropolitan Water Board is to provide electrical plant and buildings at a cost of £14,680; install electric pumping machinery (£10,750); and install electrical plant, etc. (£4,650). Pumping plant is also to be provided at various works for improving filter bed cleansing at a cost of £5,000.

Lowestoft.—LIGHTING ROAD OBSTRUCTIONS.—The Council, having been advised by the Ministry of Home Security that in certain cases the lighting of road obstructions should be by electricity instead of oil, has approved a scheme for electric lighting to cost about £140. Maintenance will cost £40 a year instead of the present £196 with oil.

Millom.—STREET LIGHTING CONCESSION.—The South Cumberland Electricity Co., Ltd., has notified the Rural District Council that it will reduce the amount payable under the street lighting agreement from half to quarter of the agreed charges during the black-out.

Morley.—SUPPLIES TO CIVIL DEFENCE DEPOTS.—At its last meeting the Electricity Committee decided that it could not grant an application by the County Council that the special all-in tariff of 2d. per kWh, with a minimum charge of £2 per annum, for supplies to public shelters should be applied to all Civil Defence depots.

Rushden (Northants).—SHELTER LIGHTING.—The regional authorities have deferred the Urban District Council's application for permission to install electric lighting and heating in the unfinished public shelters.

OVERHEAD CABLES.—The Council has agreed not to oppose an application by the Rushden & District Electric Supply Co., Ltd. for permission to erect overhead lines.

Swindon.—LOANS SANCTIONED.—The Electricity Committee has obtained sanction to loans for buildings and plant.

Yorkshire.—SCHOOL LIGHTING.—The North Riding County Education Committee is to consider the installation of electric lighting at the Amotherby, Ebberston, Great Smeaton and Slingsby Council Schools.

Overseas

Argentina.—FUEL DIFFICULTIES.—The *Review of the River Plate* reports that the Electricity Producers' and Distributors' Association, representing more than 400 private concerns which supply electricity to some 900 localities in the provinces and territories, has addressed a memorandum to the Ministry of Marine setting out the difficulties which have been created by the restriction of fuel, and stating that electric power houses equipped with internal-combustion engines cannot dispense with fuel-oil or other heavy combustibles.

Chile.—ELECTRICAL DEVELOPMENT.—M. Guillermo Moore, chief of the engineering department of power and fuel, Corporation de Fomento de la Production, Chile, who is visiting Canada to study hydro-electric development there, said in an interview at Montreal that up to now the biggest power development in Chile was at the copper mines in Chuquicamata, near the Peruvian border, where there was a capacity of 100,000 HP. This company, of which he was chief engineer, expected to develop 300,000 HP in five plants. He said that Chile was admirably suited for water-power, as its rivers were short and swift.

Europe.—USE OF ELECTRICITY RESTRICTED.—The use of gas and electricity in Bohemia and Moravia has been drastically curtailed, *Reuter* reports. From this week, according to Prague radio. there is to be no gas for private householders between 2 p.m. and 6 p.m., while the electricity supply is being cut off in the mornings. In Italy a 20 per cent. reduction in the industrial consumption of electricity has been decreed and in

Switzerland, owing to the effect of the abnormal drought and intense cold on the water-power resources, the Federal authorities are increasing the cut in consumption from 30 to 50 per cent.

TRANSPORT

Darlington.—ADDITIONAL TROLLEY-BUSES.—The Corporation is to purchase eight trolley-buses, the chassis of which will be supplied by Karrier Motors, Ltd., and the bodies by East Lancashire Coachbuilders, Ltd.

France.—UNDERGROUND STATIONS CLOSED.—According to the Swiss broadcasting service the shortage of electricity has resulted in a further 25 stations on the Paris underground railway being closed, making 49 in all.

South Africa.—LEGISLATION AND TROLLEY-BUSES.—Effects of the Motor Carrier Transportation Amendment Act, 1941, on trolley-bus development are referred to in the annual report of the Central Board Transportation Board, an abstract of which is published in *Modern Transport*. It is stated that the Board's powers under the Act do not facilitate control of road transport or the introduction of new trolley-bus services. In a hypothetical case in which a route is served by two motor-bus operators, one of whom one desires to convert the service to trolley-buses, although the Board may be in favour of the more modern vehicles it is nevertheless obliged under the Act to protect the existing motor-bus service. This arises out of the redrafted definition of a motor vehicle to make it clear that trolley-buses are included unless operating on a route served by trams. It can be argued that the Board has the right to refuse all applications for trolley-bus services, but it would be a definite hardship on the travelling public if this were necessary merely because the Board could not impose control.

South Shields.—TROLLEY-BUS SERVICE EXTENSION.—The Town Council has approved a proposal of the Transport Committee for a small extension of the trolley-bus service.

Southend-on-Sea.—SUPERSESSION OF TRAMS.—The new trolley-bus and motor-bus services which are to replace the present tramways will, it is expected, be in operation by the spring, the work of conversion being already well advanced. The cost is estimated at about £7,500, but as the tramlines, which are of high-grade steel, are expected to fetch some £5,400, and repairs which would have been necessary to them if the tramways had been retained would have cost about £5,000, the conversion will be achieved in particularly favourable circumstances.

Parliamentary News

(By our Special Reporter)

Average Electricity Prices

IN the House of Commons on January 20th, Mr. A. Edwards asked the President of the Board of Trade what were the highest, the lowest and average charges for electric lighting and power.

Sir Andrew Duncan said that for the year 1939-40, the latest for which figures were available, the approximate average price for lighting, heating and cooking supplies taken together was 1.58d. per kWh and for industrial power supplies 0.649d. per kWh. The highest and lowest flat rates for lighting were of the order of 10d. to 1s. per kWh and 2d. per kWh respectively. Power supplies were given on two-part or block tariffs and comparable information was not readily available. If, however, the hon. member would notify him of any particular undertakings which he had in mind he would be pleased to have inquiries made into the matter.

Consumers' Grievances

Mr. Sorensen asked the President of the Board of Trade whether he had any proposals to deal with the grievances of domestic consumers of electricity who responded to the appeal to economise in electricity consumption but had to pay the balance between the charge for the actual amount of electricity consumed and the minimum charge imposed by electricity undertakings, and were thus involved in expenditure incommensurate with the service rendered.

Sir Andrew Duncan said he was not aware that the services rendered by electricity undertakings were incommensurate with the authorised minimum charges which consumers were required to pay. If, however, the hon. member would bring to his notice any particular case in which the minimum charge was considered to be excessive, he would be pleased to inquire into it.

Fuel Controllers

Mr. Keeling asked the President of the Board of Trade what were the functions of the Regional Fuel and Power Controllers; and by what authority they were issuing questionnaires.

Sir Andrew Duncan said he appointed Regional Fuel and Power Controllers for the purpose of ensuring adequate co-ordination in matters concerning the supply of the different kinds of fuel and power and in emergency conditions to take charge under the Regional Commissioner. The Controllers were therefore acting on his authority.

Failure to Supply

On January 22nd, Sir Smedley Crooke asked the President on the Board of Trade if he was aware that applications by non-statutory electricity suppliers to the Electricity Commissioners for electricity supply orders to provide electricity in districts where the authorised suppliers failed to carry out the powers granted to them were, in some cases, ignored by the Commissioners; consequently districts were denied the service which would be forthcoming; and if he would take steps to remedy this state of things so that rural districts were not denied the desired convenience.

Captain Waterhouse, who replied, said that the Electricity Commissioners informed the President that no application by a non-statutory electricity supplier for an electricity supply order had been made to them since the outbreak of war.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The Nigerian Electric Supply Corporation, Ltd., has declared an interim dividend of 4 per cent., less tax, in respect of the year to February 28th. This is the first payment on account of the current year, and compares with 4 per cent. paid in November, 1940, which was followed by a second interim also of 4 per cent., making 8 per cent. for the year ended February 28th, 1941. No final dividend was paid.

The Adelaide Electric Supply Co., Ltd., reports a gross revenue of £1,258,109 for 1940-1, against £1,134,017 in the preceding year. The net revenue rose from £480,633 to £493,468. The ordinary dividend is maintained at 10 per cent. by a final distribution of 5 per cent. Sales of energy increased from 150 to 173 million kWh.

British Industrial Plastics, Ltd., report a net profit of £15,989 for 1940–41 (after providing £71,200, against £56,500 for taxation) as compared with £24,398 for 1939–40. The dividend is reduced from 8 to 6 per cent. and £6,288 is carried forward.

Philco Radio & Television Corporation of Great Britain, Ltd.—At meetings of the shareholders held on Monday last the scheme for dealing with the arrears of preference dividend by the issue of funding certificates was approved.

The Yorkshire Electric Power Co. proposes to pay a final dividend of 5 per cent. on the ordinary stock, again making 8 per cent., less tax, for the year.

Newman Industries, Ltd., are maintaining their preferred dividend at 8 per cent. by the final payment of 5 per cent.

The Dublin United Transport Co., Ltd., has announced a final dividend of 3 per cent., making 5 per cent. for the year (against 4 per cent.).

The Anglo American Telegraph Co. is paying a first and final dividend of 1½ per cent. on the deferred shares (same).

Bennis Combustion, Ltd., is paying an interim dividend of 5 per cent. (same).

Companies' Returns

Statements of Capital

City of London Electric Lighting Co., Ltd.—Capital, £2,400,000 in £400,000 6 per cent. first preference stock, £300,000 8 per cent. second preference stock, £1,600,000 ordinary stock and 100,000 unclassified shares of £1. Return dated March 26th (filed August 11th). All stock taken up. £1,500,000 paid on £400,000 1st preference, £300,000 2nd preference and £800,000 ordinary stock. £800,000 considered as paid on £800,000 ordinary stock. Mortgages and charges: £540,383.

Mid-Cheshire Electricity Supply Co., Ltd.—Capital, £1,000,000 in 300,000 4 per cent. cumulative preference, 10,000 5 per cent. cumulative preference, 60,525 7 per cent. cumulative preference, 529,127 ordinary and 100,348 unclassified shares of £1. Return dated May 9th (filed October 2nd). 300,000 4 per cent. preference, 10,000 5 per cent. preference, 60,525 7 per cent. preference and 529,127 ordinary shares taken up. £748,374 19s. 4d. paid on 300,000 4 per cent. preference, 10,000 5 per cent. preference, 60,525 7 per cent. preference and 378,611 ordinary shares, leaving £461 0s. 8d. calls unpaid. £150,816 considered as paid on 300 7 per cent. preference and 150,516 ordinary shares. Mortgages and charges: Nil.

Oriental Telephone and Electric Co., Ltd.—Capital, £900,000 in 300,000 7 per cent. cumulative preference and 600,000 ordinary shares of £1. Return dated August 12th. 188,791 preference and 570,199 ordinary shares taken up. £479,918 paid on 188,791 preference and 291,115 ordinary shares (including £12 10s. paid on forfeited shares). £279,084 considered as paid on 279,084 ordinary shares. Mortgages and charges: Nil.

Aron Electricity Meter, Ltd.—Capital, £350,000 in 350,000 ordinary shares of £1 each. Return dated September 12th. 151,936 shares taken up. £104,660 15s. paid (including £28,692 15s. premium). £75,968 considered as paid. Mortgages and charges: Nil.

Concordia Electric Wire Co., Ltd.—Capital, £100,000 in 100,000 shares of £1 each. Return dated October 16th. 57,319 shares taken up. £57,319 paid. Mortgages and charges: Nil.

Increase of Capital

Dacier, Ltd.—The nominal capital has been increased by the addition of £2,500 in £1 ordinary shares beyond the registered capital of £5,000.

Mortgages and Charges

H. H. Linton & Co., Ltd.—Satisfaction in full on November 25th, 1941, of debenture dated June 12th, 1940, and registered June 13th, 1940, securing £3,000.

Bankruptcies

T. Maund, 37, Earle Road, Bramhall, formerly trading at 80, Wellington Road North, Heaton Norris, Stockport, as an electrical engineer under the style of Beacon Electrical Co.—Last date for receiving proofs for dividend February 4th. Trustee, Mr. F. H. Langmaid, 20, Byron Street, Manchester, 3, Senior Official Receiver.

L. R. Williams, electrical contractor, 1A, Angel Street, Bridgend.—Receiving order made January 19th on debtor's own petition.

Liquidations

Berners Radio, Ltd.—Meetings February 20th, at 11, Ironmonger Lane, E.C.2, to receive an account of the winding-up by the liquidator, Mr. E. Maloney.

Wireless-Electric (Wholesale), Ltd.—Particulars of claims by February 13th to Mr. N. W. Osborne, liquidator, 11–12, Finsbury Square, London, E.C.2.

STOCKS AND SHARES

TUESDAY EVENING

THE volume of Stock Exchange business showed decided contraction during the past few business days as compared with that of the earlier part of the month. The main factors remain practically unchanged. Gilt-edged securities find ready homes when stocks come on offer, and the best-class ordinary shares in industrial companies are the subject of continual inquiry. Dividend anticipations are rife at the present time in regard to the distributions likely to be made by the Home railway companies, and also, by the equipment and manufacturing undertakings which deal with electrical plant. The supply of preference shares has again lessened. A rise of two points in Cable & Wireless preference indicates the absorption of such issues by money of which substantial amounts require employment.

Market Handicaps

The comparative tables of prices given here in the issue of January 9th showed that in the case of the London electricity companies, rises occurred in all the ordinary shares during 1941. Had there been any practical regret at the withholding of accounts, it is pretty certain that the market would have been depressed by sales on behalf of proprietors rendered apprehensive by war conditions. The price changes indicated that, so far from the market being side-tracked by investment, the contrary was the case. As has been pointed out several times here, dealers in Home electricity supply ordinary shares have been, and still are, handicapped by the lack of supply shares, which come to market and the strength of the ordinary shares has seldom been more pronounced than it is to-day. The forthcoming final dividends for the year 1941 are anticipated to be at the same rates as those of twelve months ago.

No Accounts

Most of the Home electricity supply companies make up their accounts to the end of December. Announcements of final dividends for the previous year appear, as a rule, in February and March. Owing to the advisability of refraining from the communication of details which might prove of service to the enemy, the utility companies gave very few figures in their last annual reports. No relaxation of this precedent is expected to be made this year, and those shareholders who, a year ago, were rather inclined to resent the withholding of such information as could be on no account of use to the enemy, will have to make up their minds to remain in the dark so far as the forthcoming accounts are concerned. That the shareholders as a body are well content to remain in ignorance of the manner in which their companies progressed during 1941 is obvious from the steadiness of prices in this group.

Consistent pressure to obtain preference shares is very apparent in the electricity supply market. North Eastern sevens are 1s. better at 34s. Advances have raised Scottish Power preference to 31s., Llanelly preference to 27s. 6d., and Lancashire preference to 36s. 3d. In the manufacturing list, Ferranti 7 per cent. preference show $\frac{1}{16}$ gain at 27s. 6d.

Price Fluctuations

Home electricity supply shares are mostly better where prices have changed. There are rises, for instance, in City of London, County of London, Lancashire, and Midland Corporation ordinary. Metropolitans are 9d. higher at 37s. London Power debenture strengthened to 105.

Amongst the Overseas companies, Victoria Falls Power ordinary retain the r advance at 81s. 3d. The Indian group remains out of favour, and Calcutta Electric at 33s. 6d. are 6d. lower. Oriental Telephone ordinary, with a drop of 5s. to £3, reflect the uneasiness felt regarding the Japanese advance in the Pacific area. Rubber shares, it may be noticed in passing, are a difficult market for those who want to sell at the present juncture.

Canadian Marconi at 6s. have put on 6d., being singled out for some attention by those who think there is money to be made through the purchase of low-priced shares. In the industrial group, Murex have risen 5s. to 97s. 6d., the purchasers contending that even so modest a yield as £4 2s. per cent. on the money is not incompatible with conditions of the times. Inquiry has extended to such shares as General Electric ordinary and preference, English Electric and Johnson & Phillips. Crompton Parkinsons strengthened to 22s. 6d. Westinghouse Brake at 50s. recovered the dividend deducted on January 19th. Tube Investments at 85s. 9d., and Consolidated Signals at 77s. 6d. are both easier.

Yorkshire Power

The Yorkshire Electric Power Co. is the first, as a rule, to declare its final dividend for the year, and the announcement of 5 per cent., made last week, maintains the 8 per cent. rate which has been regularly paid for twenty-three years. The price of the shares is a little better at 40s., and it is of interest to recall that the last issue of ordinary was made in February, 1939, to the holders of the ordinary and preference stock, in the proportion of one new share in five, at 30s. A previous issue, in March, 1928, offered 897,000 ordinary at 24s. to the proprietors, the proportion then being 27 new shares for 100 old shares. The company owns £153,708 ordinary stock in Electrical Distribution of Yorkshire, Ltd. With associated undertakings, it has a total area of approximately 2,685 square miles. There are

(*Concluded on page* 157)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Jan. 26	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	15	12½	53/9	..	4 12 9
British Power and Light	7	6	27/–	+6d.	4 10 7
City of London	7½	7	27/–	+9d.	5 3 9
Clyde Valley	8	8	38/3	..	4 3 9
County of London	10½	8	37/–	+9d.	4 6 6
Edmundson's:					
7% Pref.	7	7	33/3	..	4 4 4
Ord.	6	6	28/6	..	4 4 3
Elec. Dis. Yorkshire	9	9	42/–	..	4 5 9
Elec. Fin. and Securities	12½	12½	43/9	..	5 14 2
Elec. Supply Corporation	11½	10	45/–	..	4 9 0
Isle of Thanet	2	Nil	9/–	..	—
Lancs Light and Power	7½	7½	34/6	+9d.	4 7 0
Llanelly Elec.	5½	5½	22/–	..	5 0 0
Lond. Assoc. Electric	5½	4½	19/6	..	4 12 4
London Electric	7	7	24/6	..	5 14 3
London Power Deb. Red.	5	5	105	+½	4 15 3
Metropolitan	10	8	37/–	+9d.	4 6 6
Midland Counties	8	8	38/9	..	4 2 0
Mid. Elec. Power	9	9	40/–	+6d.	4 10 0
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec.:					
Ordinary	7	7	30/–	..	4 13 4
7% Pref.	7	7	34/–	+1/–	4 2 4
Northampton	10	10	44/6	..	4 10 0
Notting Hill 6% Pref. (£10)	6	6	8½	..	—
Northmet Power:					
Ordinary	10	7	35/–	..	4 0 0
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	23/9	..	5 1 1
Scottish Power	8	8	38/9	..	4 2 9
Southern Areas	5	5	18/9	..	5 6 8
South London	7	7	25/–	..	5 12 0
West Devon	5	5	21/3	..	4 14 1
West Glos.	4½	4½	20/–	..	4 10 0
Yorkshire Elec.	8	8	40/–	+6d.	4 0 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	5/-	+1/–	—
Calcutta Elec.	8*	7*	33/6	–6d.	—
Cawnpore Elec.	10	10	30/–	..	6 13 4
East African Power	7	7	27/–	..	5 3 8
Jerusalem Elec.	7	5	18/9	..	5 6 8
Kalgoorlie (10/–)	7½	7½	11/–	..	6 16 4
Madras Elec.	6*	4*	22/6	..	3 11 1
Montreal Power	1½	1½	25½	–½	5 17 8
Palestine Elec. "A"	Nil	Nil	20/9	..	—
Perak Hydro-elec.	6	7	7/6	..	18 13 4
Shawinigan Power	83cts.	90cts.	15½	..	—
Tokyo Elec. 6%	6	6	12½	..	—
Victoria Falls Power	15	15	81/3	..	3 14 2
Whitehall Inv. Pref.	7½	7½	15/–	..	10 0 0

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Jan. 26	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity:					
1950–70	5	5	110	..	4 11 1
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	108	..	4 3 1
1963–93	3½	3½	103	..	3 8 0
1974–94	3½	3½	99	..	3 5 8
London Elec. Trans. Ltd.	2½	2½	95	..	2 12 10
London & Home Counties 1955–75	4½	4½	109	..	4 2 7
Lond. Pass. Trans.:					
A	4½	4½	119½	..	3 15 1
B	5	5	119½	+2	4 3 8
C	1½	3	40	..	7 10 0
West Midlands J.E.A. 1948–68	5	5	110	..	4 11 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	106½xd	+1½	5 12 8
Def.	1½	1½	24½xd	+⅜	6 2 5
Anglo-Portuguese	8	8	15/–	..	10 13 1
Cable & Wireless:					
5½% Pref.	5½	5½	105½	+2	5 4 4
Ord.	4	4	69½	+1	5 15 2
Canadian Marconi $1	Nil	4cts.	6/–	+6d.	2 10 6
Globe Tel. & Tel.:					
Ord.	8½*	8½*	30/–	..	—
Pref.	6	6	28/9	..	4 3 4
Great Northern Tel.:					
(£10)	20	20	14½	..	—
Inter. Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	27/6	..	5 9 1
Oriental Tel. Ord.	11½*	16	60/–	–½	5 6 8
Telephone Props.	6	6	10/–	..	12 0 0
Tele. Rentals (5/–)	10	10	9/–	..	5 11 1
Traction and Transport					
Anglo. Arg. Trans:					
First Pref. (£5)	Nil	Nil	5/6	..	—
4% Inc.	Nil	Nil	8½	–3	—
Brit. Elec. Traction:					
Def. Ord.	45	45	905	..	5 0 0
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8*	8	43/9	..	3 13 1
Brazil Traction	$1	50c.	14½	+⅞	—
Calcutta Trams	8	5½	20/–	..	5 10 0
Cape Elec. Trams	5	5	18/6	..	5 8 3
Lancs Transport	10	10	45/–	..	4 9 0
Mexican Light:					
1st Bonds	5	5	75	..	6 13 4
Rio 5% Bonds	5	5	92½	..	5 8 3
Southern Rly.:					
5% Prefd.	5	5	63½	..	7 17 6
5% Pref.	5	5	106½	..	4 14 0
T. Tilling	10	10	47/6	..	4 4 2
Tilling & B.A.	7*	6½*	52/6	..	2 9 6
West Riding	10	10	39/6	..	5 1 3

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Jan. 26	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord. ..	Nil	7½	23/–	..	6 10 4
Assoc. Elec.:					
Ord.	10	10	43/9	..	4 16 3
Pref.	8	8	38/9	..	4 2 4
Automatic Tel. & El.	12½	12½	48/9	..	5 2 6
Babcock & Wilcox	11	11	45/9	..	4 16 1
British Aluminium	12½	10	45/9	..	4 7 4
British Insul. Ord.	20	20	90/–	..	4 9 0
British Thermostat (5/–)	18½	18½	13/9	..	6 14 6
British Vac. Cleaner (5/–)	12½	10	11/3	..	4 9 0
Brush Ord. ..	Nil	Nil	4/6	..	—
Callender's ..	15	15	73/9	..	4 1 4
Chloride Elec. Storage	15	15	71/3	..	4 4 3
Consolidated Signal	17	17	77/6	–½	4 7 8
Crabtree (10/-) ..	17½	17½	28/3	..	6 4 0
Crompton Parkinson Ord. (5/–) ..	30	20	22/6	+½	4 9 0
E. K. Cole (5/–) ..	Nil	7	9/–	+6d.	3 13 9
E.M.I. (10/–) ..	Nil	6	14/6	–6d.	4 2 9
Electric Construction	10½	10	34/6	..	5 16 0
Enfield Cable Ord.	16½	12½	53/9	..	4 13 0
Elecl. Switchgear (10/–)	16	10	20/–	..	5 0 0
English Electric ..	10	10	38/9	+1/6	5 3 3
Ensign Lamps (5/–)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)..	25*	22*	40/–	..	2 15 0
Ever Ready (5/–) ..	40	40	30/–	..	6 13 4
Falk Stadelmann ..	7	7½	22/–	..	6 16 4
Ferranti Pref. ..	7	7	27/6	+1/6	5 1 10
G.E.C.:					
Pref.	6½	6½	33/9	+6d.	3 17 2
Ord.	20	17½	80/–	+6d.	4 7 6
Greenwood & Batley	15	13	26/3	..	9 18 2
Hall Telephone(10/–)	15	10	15/7½	..	6 8 0
Henley's (5/–) ..	20	20	22/6	..	4 9 1
4½% Pref. ..	4½	4½	21/3	..	4 4 8
Hopkinsons ..	15	15	45/–	..	6 13 4
India-Rubber Pref.	5½	5½	21/3	..	5 3 6
Intl. Combustion	32½	30	107/6	..	5 11 6
J. Lucas	15	15	67/6	+1/6	4 9 0
Johnson & Phillips	15	15	57/6	+6d.	5 4 4
Lancashire Dynamo	20	20	66/3	..	6 0 10
Laurence, Scott (5/–)	15	15	11/–	..	6 16 4
London Elec. Wire	7½	7½	25/–	..	6 0 0
Mather & Platt ..	13½	10	42/6	..	4 14 1
Metropolitan Elec. Cable Pref. ..	5½	5½	21/3	..	5 3 6
Murex	20	20	97/6	+5/–	4 2 0
Pye Deferred (5/–)..	25	25	15/–	..	8 6 8
Revo (10/–) ..	5	20	25/7½	..	7 16 0
Reyrolle	12½	12½	56/3	..	4 9 0
Siemens Ord. ..	7½	7½	25/–	..	6 0 0
Strand Elec. (5/–) ..	2	4	3/6	..	5 14 4
S. Smith (1/–) ..	50	37½	7/–	..	5 7 2
Switchgear & Cowans (5/–) ..	10	15	10/–	..	7 10
Tel.Condenser(10/–)	Nil	5	11/3	..	4 9 0
T.C. & M.	10	10	41/3	..	4 17 0
Telephone Mfg.(5/–)	9	9	9/–	..	5 0 0
Tube Investments..	23½	20	85/9	–½	4 13 3
Vactric (5/–) ..	4	Nil	3/6	..	—
Vickers (10/–) ..	10	10	17/3	..	5 16 0
Ward & Goldstone (5/–)	20	20	16/6	..	6 1 3
Westinghouse Brake	17½	10	50/–xd+1/–		4 0 0
Walsall Conduits(4/–)	55	55	32/6	..	6 15 4
West, Allen (5/–) ..	7½	7½	5/–	..	7 10 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Concluded from page* 155)

83 electricity undertakings in the area of supply, and the company has bulk supply or joint working agreements with at least three-quarters of them. The main area of supply is the Yorkshire coalfield and chief manufacturing centres. In 1930, receipts came to £713,202; for the year ended December 31st, 1939, they amounted to £1,582,892.

Brush Electrical Preference

Brush Electrical Engineering 5½ per cent. cumulative preference stock has come to market during the past week. Of this there is £200,000 issued, the whole having been taken by the Associated British Engineering Co. in partial payment for certain assets prior to the outbreak of war. Until last week, no market had been made in this stock, but the £1 units are now negotiable on the basis of 19s. 9d. The annual preference dividend takes £6,325 net, and it may be recalled that in 1940 the company made £52,000 profit, transferring also £25,000 to general reserve. At the price mentioned the yield on the money is, of course, practically 5½ per cent., allowing for expenses. Brush ordinary shares remain at 4s. 6d., the price which has been held tenaciously for some weeks past.

South Americans

Brazilian Traction common shares, after their last week's rise, have hardened again to 14s. 4d., the highest price for three years past. The reason for the improvement in these, as in various other stocks and shares connected with the Americas, lies in the present-day popularity of Central and South American issues. Most of them had fallen to rubbish prices. Spectacular rises in Argentine Railway stocks served to direct attention to those, and to the stocks and bonds of utility companies. The exchange position in South American States shows improvement. Speculation busies itself with a canvass of what likelihood there may be of the companies' return to a profitable position. Owing to this, Mexican, together with a number of other Latin American utility descriptions, have come into notice. The purchase of—sometimes a mere inquiry for—out-of-the-way stocks has a sharp effect upon the prices. The search for low-priced gambling counters serves to bring about rises, the extent of which is out of proportion to the amount of stock which changes hands.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *can be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1939

26897. "Regulating transformers." Akt.-Ges. Brown, Boveri & Cie. December 29th, 1938. (542236.)

1940

2374. "Radio transmitters." J. W. Dalgleish, S. R. Poole and Pye, Ltd. February 7th, 1940. (542277.)

5462. "Electric arc furnaces with removable hearths or roofs." H. A. Brassert & Co., Ltd., and R. Nissim. March 26th, 1940. (542239.)

8697. "Light-sensitive apparatus." Svenska Aktiebolaget Gasaccumulator. October 3rd, 1939. (542318.)

9128. "Loop antenna circuits." Philco Radio & Television Corporation. June 17th, 1939. (542241.)

9295. "Cathode-ray tubes, particularly for television transmission." Marconi's Wireless Telegraph Co., Ltd. May 27th, 1939. (542219.)

9364. "Inductance and capacity trimmer unit." Marconi's Wireless Telegraph Co., Ltd., C. P. Beanland and C. S. Cockerell. May 28th, 1940. (542223.)

9383. "Electric fires." T. G. Farish. May 28th, 1940. (542278.)

9427. "Machines for winding electric toroidal coils." P. X. Fox. May 29th, 1940. (542224.)

9428. "Coil-winding machines." P. X. Fox. May 29th, 1940. (542225.)

9632. "Dynamo-electric machinery." English Electric Co., Ltd., and H. S. Carnegie. June 1st, 1940. (Cognate application, 5498/41.) (542321.)

9717. "Conductor units for electrical wiring systems." J. F. O'Brien. June 14th, 1939. (542281.)

10440. "Combined lamp and radio receiving set." D. J. Crowley. June 15th, 1940. (542322.)

10669. "Welding fluxes." British Thomson-Houston Co., Ltd. June 21st, 1939. (542243.)

10707. "Coupling circuits for electronic discharge devices." Standard Telephones & Cables, Ltd. (Le Matériel Téléphonique Soc. Anon.). July 30th, 1940. (Convention date not granted.) (542226.)

10780. "Furnaces for the heat-treatment of materials." Birmingham Electric Furnaces, Ltd., and A. G. Lobley. June 24th, 1940. (542227.)

10948. "Arrangements for producing and viewing optical images produced by electron bombardment of fluorescent screens." Electric & Musical Industries, Ltd., J. D. McGee and H. G. Lubszynski. June 27th, 1940. (542245.)

10967. "Electric torches." J. H. Runbaken. June 27th, 1940. (542230.)

10970. "Electric arc rectifiers." British Thomson-Houston Co., Ltd. (Tokyo Shibaura Denki Kabushiki Kaisha.) June 27th, 1940. (542283.)

11001. "Electrical connections for vacuum tube apparatus." Standard Telephones & Cables, Ltd., and C. N. Smyth. June 28th, 1940. (542174.)

11003. "Design of broad-band repeaters." Standard Telephones & Cables, Ltd. September 29th, 1939. (542175.)

11004. "Telecommunication exchange systems." Standard Telephones & Cables, Ltd., E. P. G. Wright, G. C. Hartley and H. R. Stokes. June 28th, 1940. (542176.)

11059. "Electron discharge devices of the magnetron type." Marconi's Wireless Telegraph Co., Ltd. June 30th, 1939. (542285.)

11072. "Electric protective arrangements." A. Reyrolle & Co., Ltd., and R. H. Coates. July 1st, 1940. (542287.)

11160. "Electro-magnetic switching arrangements for the automatic application and selection of voltage supplies from a current source." C.A.V., Ltd., and W. H. Glaser. July 2nd, 1940. (542327.)

11312. "Elastic fluid turbines." English Electric Co., Ltd., and H. G. Yates. July 5th, 1940. (542292.)

11395. "Lighting and sterilising apparatus." G. R. Shepherd. (Westinghouse Electric International Co.) July 8th, 1940. (542246.)

11436. "Automatic charging arrangements of electric storage batteries." Chloride Electrical Storage Co., Ltd., and V. A. Lord. July 9th, 1940. (542328.)

11503. "Twin-lens camera with photo-electric exposure meter." Zeiss Ikon Akt.-Ges. October 18th, 1938. (542329.)

11704. "Electric translating devices embodying thermal protective apparatus." Westinghouse Electric International Co. July 13th, 1939. (542181.)

11707. "Speed-control system for a multi-engine power plant for the electric propulsion of ships." British Thomson-Houston Co., Ltd., D. E. Jewitt and J. Calderwood. July 15th, 1940. (542248.)

12023. "Microwave devices." Marconi's Wireless Telegraph Co., Ltd. July 21st, 1939. (542182.)

12310. "Cathode-ray tubes." Marconi's Wireless Telegraph Co., Ltd. July 29th, 1939. (542332.)

12374. "Two-way transmission systems." Associated Electric Laboratories, Inc. August 14th, 1939. (542252.)

14740. "Valve-operated variable reactors." General Electric Co., Ltd., and L. C. Stenning. September 30th, 1940. (542257.)

15336. "Television systems and synchronising means therefor." Standard Telephones & Cables, Ltd. October 19th, 1939. (542258.)

15654. "Systems and methods for television reception." Standard Telephones & Cables, Ltd. December 22nd, 1939. (542259.)

15811. "Ticket forming and printing mechanism and the like." Westinghouse Brake & Signal Co., Ltd. and M. H. Robinson. October 29th, 1940. (542297.)

16273. "Electric accumulators." Chloride Electrical Storage Co., Ltd. (C. D. Galloway). November 8th, 1940. (542298.)

17626. "Starters for electric motors." British Thomson-Houston Co., Ltd. December 14th, 1939. (542189.)

17833. "Electrical condensers." P. A.

Sporing and Telegraph Condenser Co., Ltd. December 18th, 1940. (542190.)

18197. "Elastic fluid turbine arrangements." British Thomson-Houston Co., Ltd. December 28th, 1939. (542191.)

1941

643. "Contacts for electric switches." British Thomson-Houston Co., Ltd. January 20th, 1940. (542342.)

1045. "Supporting arrangement for elastic fluid turbine diaphragms." British Thomson-Houston Co., Ltd. January 25th, 1940. (542197.)

1068. "Electric timing devices." Igranic Electric Co., Ltd., and P. W. Townsend. January 27th, 1941. (542198.)

3788. "Telephone systems." Automatic Telephone & Electric Co., Ltd., T. B. Preist and G. W. Thompson. March 20th, 1941. (542345.)

5438. "Safety switch mechanism for electric wash boilers and the like." J. H. Tucker & Co., Ltd., and F. C. Fuke. April 28th, 1941. (542307.)

6400. "Magnetic sound-recording." E. Schroter. May 19th, 1941. (542348.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—NEW SOUTH WALES.—March 19th. Sydney County Council Electricity Department. Motor-driven vacuum cleaning plant, fixed type, for Bunnerong power station. Specification 570.

Belfast.—February 11th. Electricity Department. Supply of electrical materials. (January 16th.)

Birkenhead. — February 16th. Electricity Department. Power transformers and electric lamps. (See this issue.)

Lanark.—County Council. Various works, including electrical and heating, at cooking centres. County Architect's Department, 34, Albert Street, Motherwell.

Manchester.—February 4th. Electricity Committee. Extension to coal conveying plant. Specification, etc., from Mr. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.

Plymouth.—February 14th. Electricity Supply Department. Condenser circulating water screen. (See this issue.)

Tottenham.—February 13th. Borough Council. Electric lamps. Schedule No. 20. Forms of tender from E. Townson, town clerk, Town Hall, London, N.15.

West Midlands.—February 3rd. Joint Electricity Authority. Grab crane and excavator at Wolverhampton generating station. (January 16th.)

Orders Placed

Bradford.—Electricity Committee. Accepted. Two steam valves for the Valley power station.—Hopkinsons.

Cardiff.—Electricity Committee. Accepted. High-voltage switchgear (£1,162). — G.E.C. Switchgear (£1,727). — Metrovick. Multicore power and control cables (contract extended).—Aberdare Cables.

Glasgow.—Health Committee. Accepted. Two electrically driven pumps, &c., at Woodilee Mental Hospital water supply (£374).—Harland Engineering Co.

London.—ISLINGTON.—Electricity Committee. Accepted. Switchgear and other substation equipment (contract extended for three years).—Electric Construction Co., Ltd.

HAMMERSMITH. — Executive Committee. Accepted. Cables (£763).—Sloan Electrical Co.

Morley.—Electricity Committee. Transformers (renewal of contract for twelve months).—C. A. Parsons & Co., Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Altrincham.—Houses; Syddall & Baines, Grove Lane, Timperley.

Ancoats.—Canteen, E. Raffles & Co.; R. Thomasson, architect, 16, Moor Lane, Kersal, Broughton, Salford, 7.

Batley.—Garage, off Cedar Grove; Yorkshire Co-operative Laundry Federation, Bradford Road East, Batley, Yorks.

Billingham-on-Tees.—British Restaurant, north of Billingham Station; J. H. Hill, U.D.C. surveyor, Council Offices, Haverton Hill.

Chorlton-on-Medlock. — Rebuilding after fire; E. A. Newton, architect, Bow Lane, Manchester, 2.

Coventry.—Additions; Banks & James, Ltd., wholesale tobacconists, Fleet Street.

Canteen; Coventry Radiator & Presswork Co., Ltd., Sir Henry Parkes Road.

Canteen; Rubery, Owen & Co., Ltd., Britannia Mills, Payne's Lane.

Workshop; F. G. Plumb & Sons, Ltd., plumbers, Earlsdon Avenue.

Children's Homes, Remand Home, extensions at King Henry VIII School, and camp school; F. H. Harrod, B.A., director of education, The Council House.

Durham.—Shelters at Stockton Secondary School (£338); county architect, 34, Old Elvet, Durham.

British Restaurant, Back Silver Street; city architect.

Eccles.—Electric lighting and heating in school shelters (£1,852); C. V. Johnson, borough electrical engineer, Town Hall.

Gateshead.—Additions for British Ropes, Ltd.

Gorton.—Additions for Follows & Bates; Cruickshank & Seward, architects, 16, Princess Street, Manchester.

Morley.—Kitchen, Atlas Mills, East Ardsley; T. Ambler & Son.

Additions; R. & J. Horsfall, Ltd., Church Street.

Northenden.—Extensions for C. H. Johnson & Sons, Ltd.; L. Brown & Sons, Ltd., building contractors, Station Road, Wilmslow, Ches.

Houses, Holmewood Road and Shandon Avenue; Marsden Building Society, 2, Russell Street, Nelson, Lancs.

Salford.—Additions, Crowther Street and Oldfield Road; Halliday & Agate, architects, 14, John Dalton Street, Manchester, 2.

Additions, Elton Street and Carey Street; W. W. Hill, Son & Wallace, Ltd., Lower Broughton, Manchester.

Sedgefield.—British Restaurants at Fishburn, West Cornforth, Ferryhill and Chilton Buildings; J. Tarran, surveyor, Rural District Council offices, Sedgefield.

Sheffield.—First-aid post and cleansing station; Arthur Lee & Sons, Ltd., Bessemer Road.

Stockton-on-Tees.—Canteen, etc., Church Road, for F. Kidd & Sons (Engineers), Ltd.

Hutments to provide additional school accommodation at Frederick Nattrass School; borough architect.

Sunderland.—Canteen for Sunderland Forge, Ltd.; W. & T. R. Millburn, 17, Fawcett Street.

Wellingborough.—Houses; surveyor, Rural District Council.

Wigan.—Canteen, Darlington Street East; English Tools, Ltd., 15, The Wiend.

Canteen, Lancashire Cotton Corporation, Ltd. Blackfriars House, Manchester, 3.

Australian Cable Manufacture

Payment of Bounty Proposed

(By a Correspondent in Sydney, N.S.W.)

THE Australian Tariff Board has been inquiring into the question of assistance for the manufacture in Australia of covered electric cable and wire. Duties applying to imports of this kind at the present time are as follows:—Customs, *ad valorem:* British preferential, free; intermediate, 15 per cent.; general, 15 per cent. Primage, *ad valorem:* British preferential, 4 per cent.; intermediate, 4 per cent.; general, 10 per cent. In addition, under the Customs Tariff (Special War Duty) Proposals of November, 1940, these imports are subject to a surcharge of 10 per cent. on the customs duty and primage.

Australian statistics do not show the exact imports but include a number of different headings. The most important heading is "cable and wire, covered; electric light and power, other", total imports of which were valued at £848,052 (all the figures are in pounds sterling, not Australian pounds) for the year ended June 30th, 1939. Of this total the United Kingdom share was £779,229, that of Germany £31,000, Belgium £18,000, the Netherlands £7,500, United States £5,000, and Canada £3,000.

Imports of "electric light and power cable, paper-insulated, lead-covered" were valued at £165,329, almost entirely from the United Kingdom. Imports of all other covered cable and wire were valued at £132,488, the United Kingdom supplying to a value of £111,000, Germany £10,000, United States £5,000 and Canada £1,600. It is estimated by the Tariff Board that the average requirements of the Australian market of all types of insulated cable and wire, valued on a wholesale basis, would not be less than £1,200,000.

Prior to early in 1940 all of Australia's requirements of these wires came from overseas. In May of that year the Olympic Tyre and Rubber Co., of Melbourne, began to manufacture certain types of rubber-insulated electric cable and wire. A second company, Cable Makers Australia Pty., Ltd., was formed to manufacture similar cables in New South Wales, the intention being to begin operations early in 1941. Owing to difficulty in obtaining the requisite machinery the opening of this plant has been delayed.

Because the two local factories are capable of meeting only a fraction of Australia's cable requirements of these cables the Board has not considered it advisable to protect the local industry by introducing higher customs duties or by "dumping" duties. It was therefore deemed desirable to furnish assistance in the form of a bounty, the amount recommended by the Board being at the rate of 4d. per pound of copper wire used in the manufacture of rubber-insulated cables and wires of the types covered by the tariff items. It has also recommended that the amount of the bounty paid in respect of each fiscal year should be not more than £25,000 and that any unexpended balance in the first year should not be carried over to the second year.

Sales by the manufacturers direct to Government Departments for defence purposes should, said the Board, be excluded from the bounty because of special arrangements made between the suppliers and the Governments on all such contracts. It was also recommended that if the net profits of any manufacturer in any one year should exceed 10 per cent. on the capital invested, a portion of the bounty should be withheld sufficient to reduce the net profits for that year, including any bounty payable, to 10 per cent. on the capital invested.

The Board has also recommended that the bounty shall be paid for two financial years only and that the whole question shall be reopened at the end of the present year. A relatively short period for the agreement was recommended because it was felt that certain British manufacturers, now that they had an interest in at least one of the local producers, might not be so keen to sell below the British price as before. It was also felt that if this position should develop, protection would be afforded by an increase in the customs tariff, especially if at that time the local manufacturers were able to meet the bulk of Australian requirements.